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August 13, 1956

Electrical World

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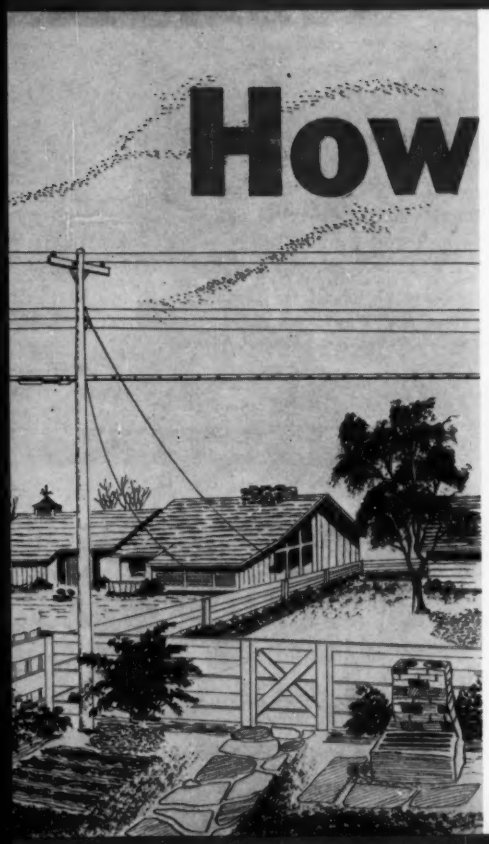

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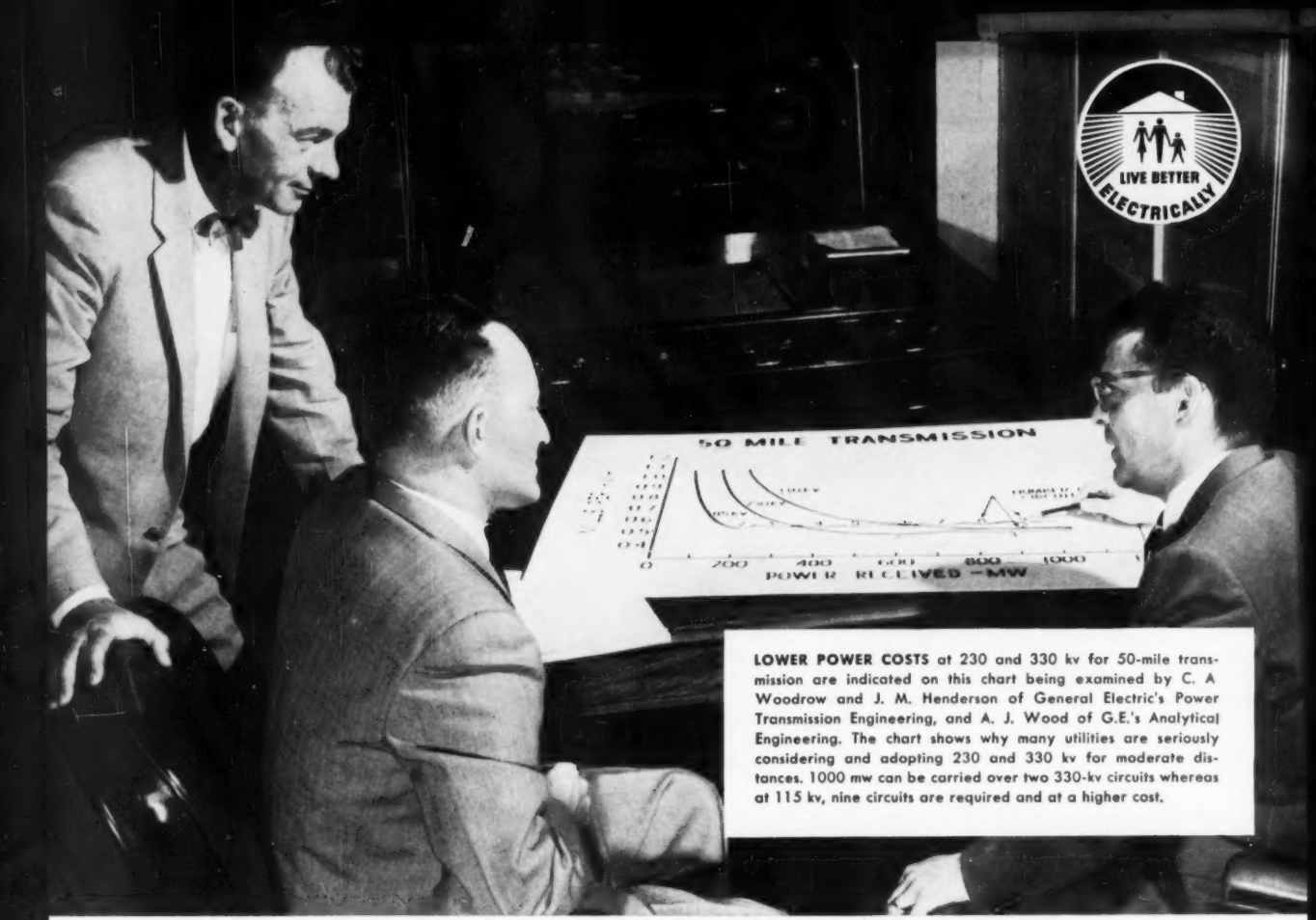

LOWER POWER COSTS at 230 and 330 kv for 50-mile transmission are indicated on this chart being examined by C. A Woodrow and J. M. Henderson of General Electric's Power Transmission Engineering, and A. J. Wood of G.E.'s Analytical Engineering. The chart shows why many utilities are seriously considering and adopting 230 and 330 kv for moderate distances. 1000 mw can be carried over two 330-kv circuits whereas at 115 kv, nine circuits are required and at a higher cost.

Today's economics herald higher transmission voltages

Balance between transmission line charges and apparatus costs favor adoption of extra-high voltage

POWER INTERCHANGE in large blocks will be made possible upon completion of a 90-mile, 330-kv transmission line between A.G.&E. subsidiary, Indiana and Michigan Electric, and Commonwealth Edison. 500 towers, 145 feet high, will carry the lines. Eventual capacity may be 1,000,000 kw.

Many electric utilities faced with the need for transmitting increasingly larger blocks of power are reappraising their transmission voltage requirements. Their findings, and the results of recent General Electric studies show that the use of higher transmission voltages is often justified when load is sufficiently high.

During the last ten years, advances in high-voltage apparatus design and application have held the cost of these items down relative to increasing line and right-of-way costs. Today, economical transmission of large blocks of power may be achieved—even at moderate distances—with voltages in the 230-330 kv range. As right-of-way charges go up and distances increase, the prospect of using 330-kv transmission becomes increasingly attractive. In addition to greater economy, higher transmission voltages provide more effective utilization of available rights-of-way. For example, the circuit capability at 330 kv can be approximately eight times that obtainable at 115 kv.

Other recent General Electric studies include the effects of extra-high voltage on the economies obtainable with high capacity system interconnections. These studies further emphasize the attractiveness of EHV.

For assistance in predicting the economies effected by extra-high-voltage transmission in terms of your system, contact your General Electric Apparatus Sales Representative. Copies of the General Electric study on high-voltage transmission may be obtained by writing for bulletin GET-2667, General Electric Company, Schenectady 5, New York. 301-289

MORE POWER TO AMERICA

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Electrical World

Published for 82 years for those engaged in the business of generating, transmitting, distributing, or supplying electric power

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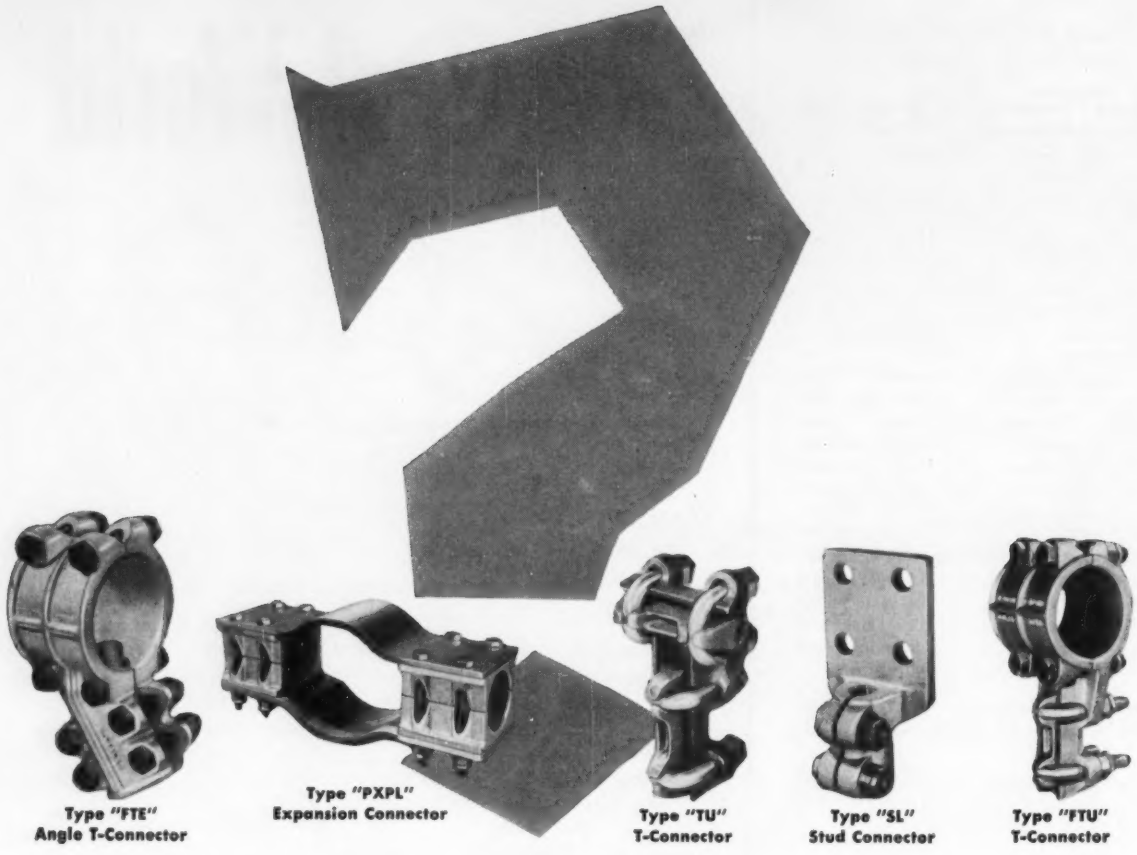
• • •

COMING NEXT WEEK—In expanding their systems in the face of rising costs, electric companies are showing great ingenuity in developing construction ideas which save money. Some of these will be revealed in industry report.



Type "FTE" Angle T-Connector

Type "PXPL" Expansion Connector

Type "TU" T-Connector

Type "SL" Stud Connector

Type "FTU" T-Connector

What's your power connector problem?

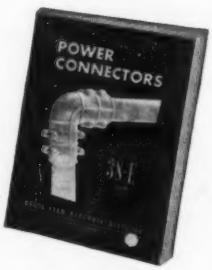
Frequently, power connections require an unusual type connector—or a special one designed or adapted to the exact purpose. If you have such a problem, there's an easy way to solve it.

Here's the likely answer—

The answer may be in one of two directions. First, you may obtain the exactly right connector from Delta-Star's complete line. Delta-Star offers tubing to tubing connectors, cable to cable, tubing to cable, tube or cable to bar, square tubing, flexible connectors, grounding and stud connectors, terminal lugs and others.

Your second choice is to take your special problem to your Delta-Star representative. Delta-Star may have already engineered and manufactured the exact connector you need.

You'll get what you want—in design and quality—when you make Delta-Star your power connector supplier.



Ask for your copy of Delta-Star's complete Power Connector Catalog 38-E.

DELTA-STAR ELECTRIC DIVISION

H. K. PORTER COMPANY, INC.

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EDITORIALS

A Cooperative Approach to Easement Planning

In Michigan, today, cooperative planning of utility easements with power and telephone companies is widely recognized among land surveyors and developers as an important early step in laying out new subdivisions and one that is of equal concern to the buyer, the developer, and the utility alike.

This situation did not always exist. How it came about is a study in cooperation and mutual understanding between industries and among different professional groups that might well be copied in areas where the rapid development of suburban sections has fostered a go-it-alone approach to subdivision planning and the design of utility easements.

For today the problems of designing utility easements have increased in complexity as a result of the trend in subdivision layout away from the grid-iron pattern of rectangular blocks. The newer pattern of curvilinear streets, loop streets, cul-de-sacs, and deep lots, often with offset lot lines raise additional and difficult problems in installing properly located and designed utility lines. Also when planned recorded easements are not provided in advance, confusion and delay are compounded in securing necessary rights-of-way for utility lines.

These conditions were made clear to a group of land surveyors, planning consultants, FHA officials, municipal and county governments in southeastern Michigan by Detroit Edison Co and Michigan Bell Telephone Co. The outcome was the formation of a working committee and the eventual preparation of a uniquely effective "Utility Easement Guide" that is already being extensively quoted throughout the state and used by land planning groups.

The organization of this group and the history of the development of the guide, as told by representatives of Detroit Edison Co who saw its development progress, is presented in this issue (page 25) in the hope that it will encourage others to try a similar cooperative approach to what is otherwise a widespread and aggravating problems.

It's Good to Be Scared

Occupational hazards are common to any number of pursuits. Advertising men have their ulcers, sand hogs have their bends, policemen have their bunions. But for sheer, unadulterated fright it seems there's no business like the power business. Witness this letter from one of our readers, a rate expert with 45 jittery years in the industry. He writes:

"When I was young I was scared by the metal filament lamp. Later I was scared by refrigerators that cost more to service than the whole gross income from them. Then I was scared by ranges that would wreck the whole system, water heaters and street lighting (whose energy) had to be sold below cost.

"Then I had a real scare—the government. It was going to take over. In 1950, television caught hold—the end was in sight for sure. Now air conditioning will probably do us in. Our only chance is to sell some of that gosh awful house or space heating to counteract the poison. And on top of this, they want quick recovery water heating."

But in spite of all this he points out, "we continue to double every ten years and pay dividends.

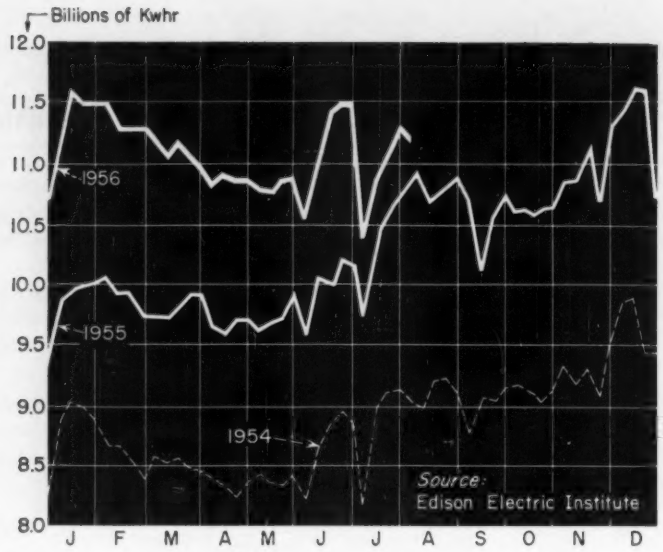
"Maybe," he concludes, "it's good to be scared."

Every Election Is Important

At this time four years ago Electrical World was being deluged with releases from industry companies telling of their campaigns to get every American to vote in the 1952 Presidential election. In this election year no such releases have been received, and an examination of employee magazines has revealed only a few such campaigns are in progress.

It is to be hoped that the dearth of such publicity is no indication that the well-executed campaigns of 1952 are not to be repeated. Because in democratic America there is no such thing as unimportant election.

Election Day, Nov. 6, is fast approaching. In some states registration is necessary to make voters eligible. So companies have no time to lose if they are to make their everybody-vote drives effective.



OUTPUT

Week ended August 4
11,190,000,000 Kwhr
Up 2.4%

Atomic Energy Commission requirements—1,125,000,000 kwhr (Electrical World estimate). Excluding AEC, output increase was 0.5%

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
Aug. 4	+2.4	+3.3	−4.8	−3.1	−1.2	+5.7	+14.4	+14.1	+11.5	+3.5
July 28	+5.3	+6.6	−0.3	+1.5	−2.8	+7.4	+13.0	+22.0	+11.3	+8.3
July 21	+4.8	+2.3	−4.7	+0.3	+0.1	+7.6	+23.2	+11.6	+13.0	+5.9

Seasonally Adjusted Index 211.0 Week Ago 212.8 Year Ago 207.1

Issue's Highlights . . . Union Electric studies pump-storage that may produce 1.6 million kw; 3 kwhr night steam generation may yield about 2 kwhr hydro in day . . . Pacific G&E readies Cow Palace for GOP's big show next week; double transformer capacity blocks hazard of power failure . . . Hydro note: Frenchman will try to make clouds for rainmakers . . . Idaho Power gambles $11-million in "bond" with Supreme Court . . . British guardedly reveal technology that may advance nuclear power dramatically . . . AEC okays construction of Power Reactor Development's 100-Mw fast neutron breeder reactor . . .

Trends toward curvilinear blocks (instead of rectangular) in subdivision layout complicate utility right-of-way easement-getting, so Detroit Ed plans ahead . . . Portland GE works out "wifesaver" electric range program that wins support and results . . . Pacific G&E applies sea water evaporators to boiler make-up water at about $1.96/1,000 gal with 1 ppm solids . . . Electric house-heating drives will sour if bad jobs crop up. Kansas G&E takes steps to prevent its campaign from turning to clabber . . . Fred Seaton discusses future Interior policies while Dems hew power platform planks.

Joint Council representing 1,700 employees of six CIO locals **calls strike against Ohio Edison.** Company reports that service is normal and plants are being manned by supervisory employees. Walkout followed rejection by union members of proposed 14.93¢ an hour increase, including 12½¢ for wages.

"Because of current bond market conditions," Southern California Ed postpones sale of $40-million first mortgage bonds, Pres Harold Quinton says.

Natural gas begins to invade Monticello, Utah, through $160-million pipeline of Pacific Northwest Pipeline Corp. Company expects to make deliveries to Portland, Ore., by end of month and to Tacoma and Seattle, Wash., by October.

NEWS OF THE INDUSTRY BRIEFLY TOLD

Washington Wire . . . AEC names Dr R. C. Dalzell chief of engineering-development branch of Reactor Development Division. Previously he was with Revere Copper & Brass . . . **Office of Defense Mobilization issues following tax amortization certificates** for transmission facilities: Indiana & Michigan Electric, 65% of $11.2 million and 35% of $1.8 million; Hartford Electric Light, 65% of $1 million; Chicago District Electric Generating, 55% of $2.8 million; Central P&L, 55% of $450,000; and Pacific G&E, 35% of $300,000.

Move is now underway to sell Tombigbee Electric Co-Operative to Alabama Power. If accomplished, sale would be the first in recent Southeastern history in which a co-op sold out to an investor-owned electric company. Tombigbee serves about 4,000 customers with power purchased from Alabama Power.

Governor Harriman announces 22-man New York State Atomic Energy Advisory Committee. Prominent industry figures on committee include: James F. Fairman, vice president, Consolidated Edison; John W. Landis, assistant manager, Babcock & Wilcox; and Admiral Earle W. Mills, president, Foster Wheeler.

Oklahoma G&E asks for $590,000 annual rate reduction from state Corporation Commission. Among other things, petition **requests lower rates for space heating and heat pumps** . . . Empire District Electric asks same commission to approve 6% rate hike for service to 29 Oklahoma lead, zinc mining, and milling companies . . . Ohio Midland L&P asks PUC approval to boost annual net revenues from rural areas by about $28,000 . . . Marietta Electric asks Ohio PUC for permission to **use an optional service rate for water heaters.** Savings for 300 water-heater customers will amount to $8,100 a year.

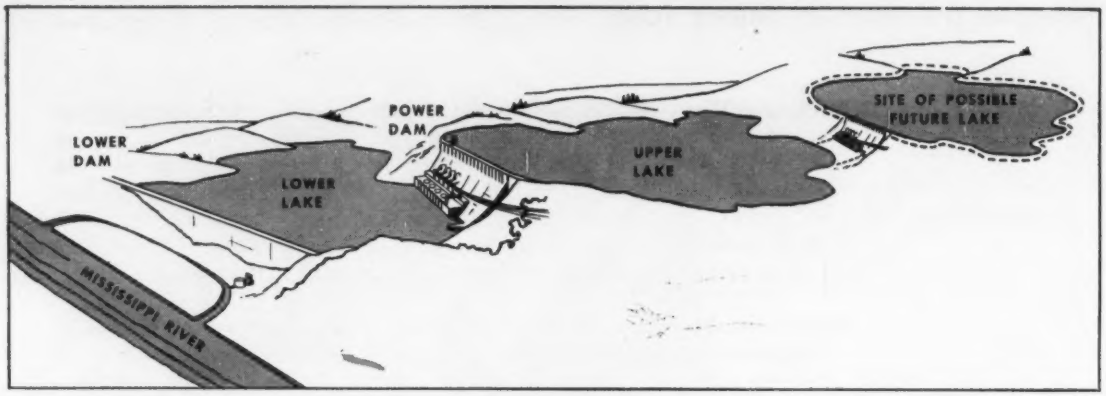
Alcoa continues talks with United Steelworkers in effort to end strike that is halting 50% of nation's aluminum production. Reynolds Metals' negotiations are expected to resume after an Alcoa-USW pact is reached . . . Research Institute of America **expects continued gradual rise in aluminum price** as result of strong demand and adequate but not excessive supply. Institute **predicts more than adequate copper supply and narrow price movements.** It advises against accumulating inventories above normal working stocks.

ABOUT PEOPLE IN THE INDUSTRY

"Now that this 298-day strike is settled, **our immediate problem is to provide the best service we can to the customers who stuck by us** during the past ten months when our turbine apparatus plant was idle," **W. C. Rowland,** vice president of Steam Turbine Division, Westinghouse Electric, tells EW. "Our employees are returning to work with enthusiasm. We expect to get back to full operations promptly."

Robert Moses, chairman of New York Power Authority, declares that he **has "no alternative" but to attack in court the right of Congress to determine who will develop Niagara power.** Congress' right to decide the issue is based on a Senate reservation in its approval of the 1950 Treaty with Canada. Moses says he has "an opinion from eminent international lawyers" that this treaty reservation is unconstitutional.

More News About People page 36



Believing this project could generate 1,600,000 kw . . .

Union Electric Studies Pump Storage

- **Test borings are underway as part of preliminary survey; economic studies to follow**
- **Dam on middle lake would develop 800,000 kw; future dam would equal output**
- **3 kwhr of night steam generation estimated to produce 2 kwhr of daytime hydro power**

Test borings are being made now for Union Electric Co at the site of its proposed 1,600,000-kw hydro power and pump storage project. The borings are part of preliminary surveys and geological explorations that are expected to determine whether the site is suitable for pump storage.

If the surveys are encouraging, engineers will concentrate next on a study of economic feasibility. Specifically, they will compare the economics of such a development with the cost of conventional steam-generated power. If they find that the project will pay off, then the utility can give serious consideration to pump storage.

INVESTIGATORS EXAMINE test cores made at proposed project site in drillings that ranged from 150 to 200-ft depths

The sketch above shows roughly how the pump storage plan would work. One dam, a small installation, would be built near the confluence of Establishment Creek and the Mississippi River, 50 miles south of St. Louis. Then a larger dam with ultimate provisions for 800,000 kw of generating capacity would be built about seven miles upstream on Establishment Creek.

The first lake would be filled initially by pumping from the Mississippi at high water. That water would be pumped into the second lake and then would be used to generate power as it flows back to the lower lake.

Pumping power would be supplied at night and on weekends from present and future steam plants. It is estimated that it would take three kwhr of night steam generation to produce two kwhr of daytime hydro power. The project would use reversible pump-turbines.

Pine Valley Dam on the middle lake, the largest of the two proposed initial dams, would rise 230 ft above the bed of Establishment Creek.

The Union Electric plan envisages a third dam that could be built a few miles above the second lake. The powerhouse at this third lake would develop another 800,000 kw and bring the total ultimate capacity of the over-all project to 1,600,000 kw—about the equivalent of the present generating capability of the entire Union Electric system.

The first two lakes would cover only about 10,000 acres because the water would be used over and over again. After the first filling of the two lakes, no additional water would have to be taken from the Mississippi except to replace evaporation loss.

The test borings that are being made at the project site are expected to determine the foundation strength and water retention ability.

Two drilling rigs are being used for the borings: One bores vertically and the other at an angle. Samples of earth structure are being taken to depths ranging between 150 and 200 ft.

The rigs bring up test cores that are of 2-in. diam and 8 to 10 ft long. The cores are laid end to end for inspection. These investigations are being handled by Bechtel Corp through a drilling sub-contractor.

PG&E Readies Cow Palace for GOP

What happens when a national political convention comes to town? What extraordinary arrangements must the local utility make to accommodate the needs of such a gathering?

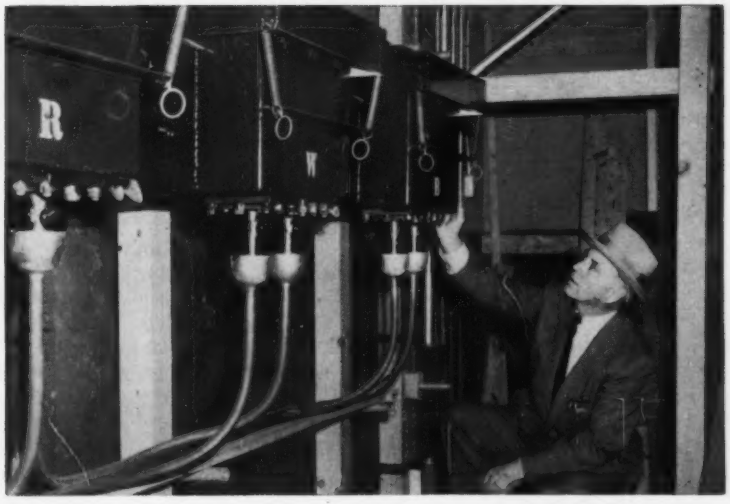
Pacific Gas & Electric Co is facing those questions squarely today with the Republican National Convention scheduled to convert San Francisco's vast Cow Palace into a national spectacle of placards, speech-making, cigar smoke, and TV cameras next week.

It was evident from the first that the Cow Palace, with its transformer capacity of 750 kva, would need substantial alterations if it were to serve the collection of TV cameras, broadcasting equipment, telephone and teletype installations, photo work rooms, special lighting, and other unusual power demands of the GOP assembly. It is up to PG&E to provide that needed power.

PG&E has been in on the planning since last fall. The utility was contacted in November by George Brayer of Brayer Electric Co, a San Francisco electric contractor who was already working with the networks.

The utility began working with the

Spare capacity (100%), switches, cables are merely part of special equipment needed



Brayer, E. R. Daniel inspect radio-TV distribution panel

Republican National Committee after receiving a letter in March from Edmund W. O'Brien, executive secretary of the arrangements committee for the convention.

On May 3, Walter Flowers, power sales engineer in PG&E's San Francisco division, met with a committee of 30 at the Cow Palace, including representatives of radio, television, press associations, newspapers, and other groups who would contribute to power demands of the convention. Representatives of the various media described their requirements, and there was a discussion of a lighting system that would not interfere with camera work.

At first, the networks were concerned with a secure power supply for their own needs. But then they realized that if the auditorium lighting and public address system went out there would be no picture nor sound to transmit, so existing load would have to be protected also.

100% Excess Capacity Installed

The optimum in reliability of service will be provided by a 100% excess of capacity in a spot network from two 12-kv feeders. To meet the expected maximum demand of 1,500 kva, PG&E installed six 500-kva, 12,500/125/216-v, three-phase transformers with network protectors along a corridor in the north "horse barn" of the Cow Palace. Transformers are paired to serve three different loads—new high bay lighting in the main arena; power needs of the commercial television and radio broadcasters, and the existing air conditioning and lighting load. About 500 kw of new high-bay lighting will increase the illumination on the arena floor from 40 ft-c to 200 ft-c in the platform area.

The radio and television load, also about 500 kw, includes studio lighting, loads of cameras, amplifiers, public address systems, and other electronic gear. Permanent load in the Cow Palace consists of almost 500 kw of air conditioning, general lighting in the arena, and incidental lighting throughout the building.

The two new loads are fed directly at 120/208 v through distribution panels directly adjacent to the transformers. Each phase and neutral leg consists of two 1,000-Mcm, single-conductor cables with rubber-like insulation.

The existing load required different treatment. Transformers in the existing vault were disconnected on their primary and secondary sides. The existing primary was extended to the new network transformers. The secondary came from the network transformers to the old bus.

Guard Against Interruption

With two 500-kva transformers paralleled on the secondary for each load of about 500 kva, there will be no interruption of service in the unlikely event that one unit should fail. All transformers in the installation are new units from normal stock.

To provide against feeder outages, two 12-kv feeders are employed. Network transformers in each pair are connected to separate feeders. Normally, the Cow Palace is served from a 12-kv overhead line which starts at an attended substation about one-half mile east of the auditorum. This line also serves other load and terminates at another substation feeder switch to the west. To take care of the convention, the line was sectionalized at a point just west of the Cow Palace tap. Remaining load on the line will be carried by another substation. A pole-top switch was installed east of the Cow Palace tap.

A PG&E service man will be on duty between these switches at all times, equipped with mobile communication. Should the normal feed be lost, he can open one switch and close the other within a few minutes.

However, the full load at the Cow Palace still will be carried on the other 12-kv underground feeder—a cable which runs adjacent to the building. This cable normally serves as an express feeder between a nearby attended sub and an attended substation further to the west. If the underground cable feeder is lost at the bus at the nearby station, operators at both attended substations can perform the necessary switching to transfer the load to feed it from another station.

Overhead and cable lines from the nearby station are on separate buses. One line is controlled by bus regulation, the other by its own feeder regulation. To equalize the voltage at the network transformers, the voltage was bucked by the feeder regulator to the same value provided by the bus-regulated line. During the convention, the operator at the station will control the feeder regulator manually to maintain this voltage equality.

New feeder facilities, in addition to the two pole-top switches in the overhead line, include a 1/0, 3/c, 15-kv cable extension from the existing vault to the network transformers. This extension is part of the cable which taps the overhead line. The customer also installed a tap from the 12-kv cable to the transformers. This tap is a 1/0, 3/c, 15-kv cable. It is protected by oil fuse switches located adjacent to the transformers.

Total cost of installation—transformers, wiring, lighting, and all the rest—will be more than $175,000. Networks will foot most of the bill, GOP National Committee the rest.

Brayer had to install more than 100,000 ft of feeder wire inside the Cow Palace. Distance from the main switchboard to the television studios averaged 150 ft—another indication of the feeders required. New special lighting totals about 1,000 kw.

New lighting was handled by C. J. Holzmueller, San Francisco lighting specialists.

The lighting system provides 150 ft-c on the arena floor, 200 ft-c on the platform. All lamps are 10,000 w.

Light Dimmers Needed

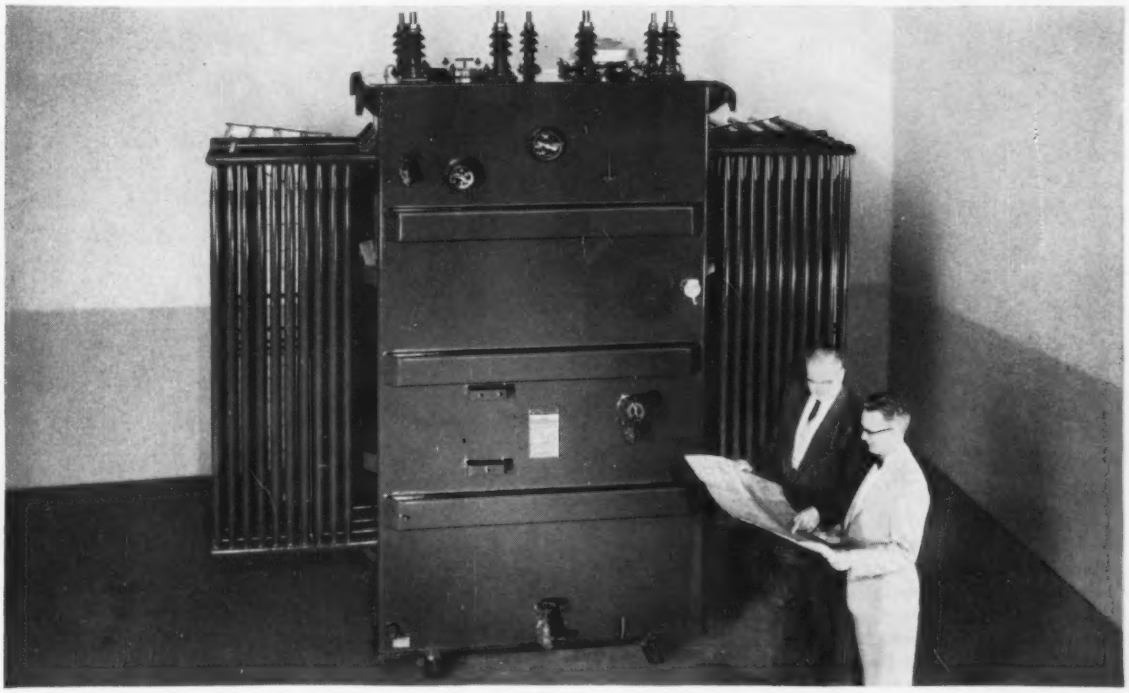
Most complicated lighting job was in the television studios adjoining the auditorium. This involved dimmers on all circuits and other features of a permanent television studio. The studio lighting will cost as much as lighting for the arena.

Most concerned in the job done by PG&E were Harry A. Lee, San Francisco division manager; E. R. Daniel, division engineer; George Brand, underground superintendent who supervised installation, and C. B. Nelson, division superintendent.

Design time... five minutes

WESTINGHOUSE ENGINEERS are now designing mathematically perfect power transformers with new IBM-705 electronic computers . . . in minutes.

J. C. Rissinger, Manager Substation Equipment Sales, reviews design improvements with Gordon Monroe, Section Mgr., Engineering Department . . . many made possible by freeing engineers from routine design calculations.



Automation has come to transformer design. Two new Westinghouse computers telescope design time to just short of nothing. That's important because designing a well-balanced transformer has been a complex and time-consuming job. Now, such factors as impedance, losses, sound level, temperature rise and dielectric strength are all integrated into product design—automatically, literally in 5 minutes.

The exclusive application of this Westinghouse pioneered innovation to the complete design of power transformers means products of mathematically perfect quality.

Specification and purchasing are simpler. Exact design information is right on hand at the time the order is negotiated. Eliminating 99% of our design time means you get faster delivery.

The time of, literally, dozens of engineers is being made available for creative development work on new and better transformers. Even when product performance already represents industry leadership, you can depend on Westinghouse to introduce new ideas that make any Westinghouse transformer a better buy.

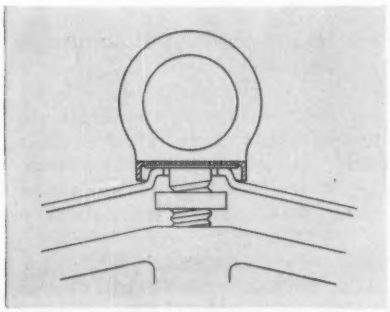
Get in touch with your Westinghouse sales engineer, today, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-70767

WATCH WESTINGHOUSE!

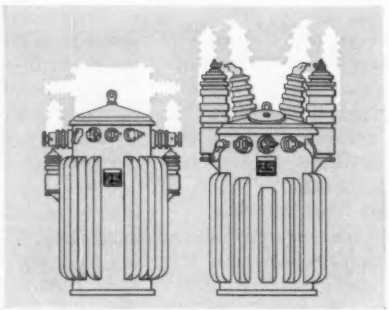
COVER THE PRESIDENTIAL CAMPAIGN ON CBS TV AND RADIO!

New Offset Breaker Handle . . . on new 1956 CSP transformers identifies new breaker trip settings increasing overload capacity 20%, emergency range 15%.

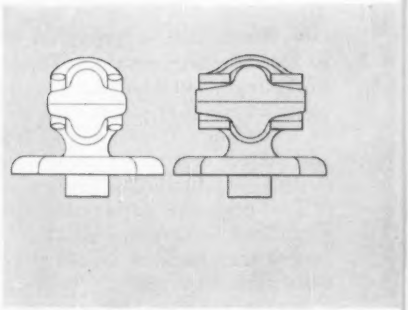
Simpler Overload Monitoring . . : new optional thermal-duty indicator records total overload hours for life of transformer; light and dial easily read from the ground.



Convenient Lifting Eyebolt (3-50 kva) . . . eliminates slings, chains, cable in mounting transformers; saves time. Each transformer gets production line pull-test at twice its own weight.



Exclusive—Reduced Height of All Transformers (15-167 kva) . . . you can replace present equipment with the next larger kva size on the same pole without change in hardware.



New LV Terminals for Aluminum or Copper Conductors . . . larger low-voltage terminal with captive bolt increases contact area, lowers contact resistance.

BUY A "BUSIER" TRANSFORMER...

Eight built-in timesavers give Westinghouse transformers capability to do more

Rating for rating, the Westinghouse transformer works longer while overloaded, giving you time—extra time—to do something about it.

In all new CSP® transformers, operating range has been increased 20%. This has been done without sacrifice of service life of the equipment. There's still more . . . higher breaker trip settings add 15% emergency capacity.

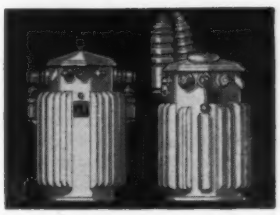
What do you get out of all this? Busier Westinghouse transformers give you more of a breather to make orderly change-outs in growth areas, or to handle unexpected peaks. Or to cope with emergencies in widely scattered places.

Easy and effective load monitoring on the conventional Westinghouse transformer is made possible with the optional new thermal-duty indicator. The indicator keeps tab on overload in two most effective and convenient ways. First, the red light goes on at the overload point. Second, the dial records total overload hours cumulatively. The story that the indicator tells comes straight from coil copper, the only true transformer-temperature indicator.

And what about installation? Below are shown a few of many other new features that simplify the job . . . right up to the time the lineman takes off his gloves.

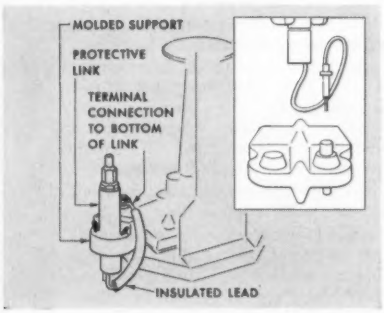
These are the things a really modern transformer can do for you. Call your Westinghouse sales engineer today, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-70769

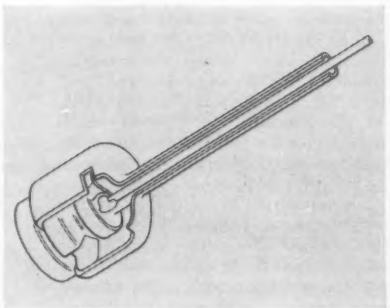


WATCH WESTINGHOUSE!

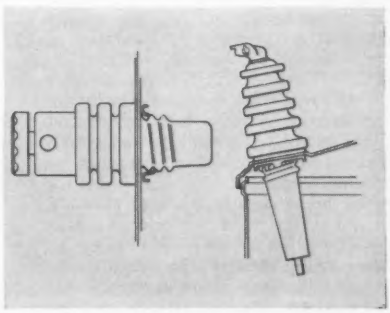
*WHERE **BIG** THINGS ARE HAPPENING FOR **YOU**!*



Faster Change-out of Protective Link on All CSP Transformers—Wall or Cover Mounted... former major repair operation now simple, routine maintenance.



Prevent Line Lockouts due to short circuiting by birds and squirrels; new, optional plastic bird guard; snaps easily over cover mounted high-voltage bushing.



Better Bushing Seal, Simpler Maintenance... internally mounted, threaded high- and low-voltage bushings with spring grip nut.

ADVERTISEMENT

CURRENT TRENDS

No. 7 in a series of articles

Cable Identification?

Nearly all electrical cables must carry identification for such various reasons as to establish identity of manufacturer, age, circuit choice and temperature rating. Of these, the important identity to most users is to readily permit proper circuit or phase selection as well as source of manufacture. The methods employed to gain these objectives must result in quick and clear intelligible information conveyed in a medium which is reasonably permanent and economical to achieve.

Circuit Identification

The subject of circuit identification in cables is somewhat complex. Its purpose is obvious—to identify a particular circuit, phase, polarity or other end use towards easier installation and maintenance. The most conservative approach eliminates all requirements for circuit identity within the cable so that each and every circuit must be electrically "rung out" or checked by the installer. However, the most popular approach requires some particular form of identity, of which there are many. Industry standards for a particular type of circuit identity have been established by many groups including IPCEA, NEMA, NEC, ASA, IMSA, Underwriters' Laboratories, and many others.

Insofar as control cable is concerned the original NEMA color sequence arrangement has become so well established that any newer methods simply represent an alternate interpretation of the original system as outlined in IPCEA Table XXX. This provides for 127 different color combinations by the employment of solid base colors and either one or two stripes or tracers of a contrasting color. This procedure as originally established was intended for fabric braid coverings where it was a simple matter to insert colored tracer threads in one or more carriers of the woven braid. To apply the identical procedure to modern jacket coverings over the insulated conductors such as Neoprene and polyvinyl chloride where braids are not employed presents certain problems. Hence, the development of a new identification method (IPCEA Method 3) now used by the Rome Cable Corporation for these types of multiconductor control cables where a contrasting, permanent surface printing is applied over a single black or neutral base color. The first six primary colors are printed 1-black, 2-white, 3-red, 4-green, 5-orange, 6-blue. For more than six conductors the tracer color is printed directly following the base color such as 7-white-black, 8-red-black, etc. To be readily distinguishable the printing appears on opposite sides of each conductor at regular frequent intervals. This low-cost method is strongly recommended for these types of cables since it expedites production, eliminates problems of color matching and fading, eliminates errors due to color blindness which is fairly prevalent, and provides a positive method of identification for the life of the cable. Other identification possibilities involving colored spirally or longitudinally applied stripes over colored jackets are also used and are described in IPCEA Methods 1 and 2.

Power cable identification is simplified since here we are only concerned with a maximum of three or possibly four phase identities which may be accomplished in a number of ways. On unshielded non-metallic sheathed cables a preferred system utilizes permanently molded longitudinal ribs on the sheath surface. The same procedure may well be used on shielded cables although appropriately printed semiconducting tapes under the metallic shielding tape has been generally accepted. On lead sheathed cables a colored tape directly under the lead sheath accomplishes the job. On certain multiconductor signal, telephone, telemetering, instrumentation and communication cables a simple method of circuit identification is frequently employed which consists of one colored conductor or pair in each layer of the multi-layer assembly of conductors. This colored circuit serves as a reference point from which the remaining circuits may be located by counting in a given direction in each layer.

Manufacturer and Miscellaneous Identification

A relatively simple time-proven system is used by most cable manufacturers to identify their product as an aid in reordering or replacing cable. Manufacturers of Underwriters' labeled products such as building wires and cords are assigned specific colored marker threads to be incorporated in their products and most manufacturers usually extend the use of these same colored threads in other cable products where practicable. This identification consists of colored combinations of small threads. For example, Rome Cable Corporation uses one yellow and one blue thread. These threads may be incorporated in appropriate locations within the cable design, such as in or over the stranded conductor, in the interstices of a multi-conductor assembly or under the outer sheath. Other methods of manufacturer identity are frequently used such as stamping on solid conductors, printed marker tapes, or surface printing in some acceptable manner such as the permanently molded name used on all Rome-60 portable cables. In some cases even the customer name and other information may be included where practicable and added cost is not prohibitive.

A printed marker tape incorporated within the cable assembly is the easiest approach to this situation which may be further embellished with unit length markings as well as date of manufacture. A rather novel method to accomplish this was developed by Rome Cable engineers (U.S. Patent 2,705,735) which comprises recording on a magnetizable wire a record of information relating to the cable and combining this wire in a suitable location within the cable construction.

The foregoing represents only a condensed review of the highlights on this little publicized subject. Most problems, of which there are many, can be solved by following appropriate standards and some of the ideas mentioned above. Here again, Rome Cable's experience might be of real value to you, so why not discuss your particular cable identification problem with us?

ROME CABLE CORPORATION, Rome, New York

Coming Up: Cloud-Making?

Utilities having substantial hydroelectric investments may get a new "production tool" if a French meteorologist's theory works. According to a published report, the director of an observatory in central France believes it may be possible to create clouds for rainmakers to use. It is his theory that a hot zone surrounded by a more temperate zone would create strong updrafts of hot air which would form rain clouds, or clouds that could be seeded to produce rain.

To test his theory, he has gone to a Belgian Congo coconut palm plantation. A center section of the plantation will be cleared and covered with charcoal. The sun should heat this area to much higher temperatures than the surrounding forest area. If the technique works, the scientist will then study the economic practicability of his scheme.

Moscow's Atom Plant

One of the first atomic electricity producing centers to get into operation is situated 100 kilometers southwest of Moscow. Lying in an enclosure guarded by jet fighters and army units, the center produces 5,000 kw and is camouflaged to resemble an antiquated factory having a chimney 100 meters high.

Behind its thick concrete walls, water is heated at high pressure to 300F to generate steam for the turbines. Several sets of pumps drive the reactor's radioactive cooling water back to it through heat exchangers. Two persons man the control room.

Power from this station is more expensive than that produced from coal, but the Russians are gaining experience which they believe will enable them to build more economic stations of 100 and 300 Mw capacities. The Russians already are exporting research reactors to their satellites.

An $11-Million Gamble

The confidence of Idaho Power Co that it will develop Hells Canyon hydroelectric project can be read into an $11-million gamble the company made with U.S. Supreme Court Justice Hugo L. Black.

Black declared he would not grant an application from the National Hells Canyon Association for a stay of the Federal Power Commission license if Idaho Power would make a "bond" not to seek compensation from the government, and to remove all company-built structures in the river if the license for Brownlee Dam ultimately is revoked.

Idaho Power said the arrangement would be satisfactory. But in so agreeing, Idaho is gambling that it will triumph in the court hearing. The utility is reported to have invested $7.5 million at the Brownlee site already, and to have committed itself for about $3.5 million in contracts that cannot be broken.

Meanwhile, construction is going ahead and a diversion tunnel for the Snake River has been completed. After Brownlee is well underway, work will start 12 mi downstream on Oxbow Dam. The Hells Canyon Dam, further downstream, must be finished by 1964, the construction permit specifies.

Engineers Look at Shortage

The American Society of Mechanical Engineers took a quick poll of 220 persons at a recent meeting and uncovered these engineers' opinions on the engineer shortage:

An easing of the shortage could come more quickly if industry relieved engineers of routine work that less highly trained persons can handle. This was expressed by 34% of those polled. Higher salaries, in the opinion of 26%, would help alleviate the shortage. Other answers included 22% who suggested a better job of selling the profession to young people is needed, 6% who do not believe a shortage exists, and 3% who believe the law of supply and demand is adequate.

Passamaquoddy Study Starts

The United States and Canada have begun a 3-year study to determine whether the tides can be harnessed in Passamaquoddy Bay, between Maine and New Brunswick, for the production of electricity. The International Joint Commission, which normally supervises boundary waters of the two countries, will undertake the study backed by a $3-million U.S. contribution, and a $300,000 Canadian contribution.

Rewiring Old Kentucky Home

Kentucky's Gov A. B. Chandler has been ordered out of the Executive Mansion which is said to be "in dangerous condition due to overloaded circuits and hot wires." He has retreated to his home at Versalles, 13 miles away while repairs are being made. Installed in 1910, the wiring was so overloaded that a mansion employee remarked that he had been buying replacement fuses "by the bushel."

Reactor Corp Formed

Dr Walter H. Zinn, former director of Argonne National Laboratory, has announced formation of General Nuclear Engineering Corp, of which he is president. He and his associates have experience in sodium-cooled, graphite-moderated, heavy water-moderated, and light water-moderated-and-cooled reactors. The company will design nuclear power, research, and special purpose reactors for domestic and foreign clients.

YONGWOL POWER PLANT, built by Japanese, was reduced to a flooded, forgotten plant during Korean War

KOREAN WORKMEN clean throttle of a 25,000-kw steam turbine at Yongwol Plant under watchful eye of Ed Rall

WORKERS CLEAN forced-draft fan rotor and put it in place after passing inspection by supervisor and teacher Rall

Ed Rall Loves

At 74, retired Detroit Ed supervisor

A retired Detroit Edison Co employee has gained an almost legendary following in the rugged northeastern region of South Korea. He's 74-year-old Edward B. Rall, who was assistant superintendent of Conners Creek Plant when he "reached the compulsory retirement age and was turned out to pasture."

With bare equipment essentials and unskilled native help, Rall helped avert a ruinous power shortage in South Korea last winter. In 17 months, he and 535 Koreans turned a flooded, rusted, almost forgotten power plant into the nation's biggest power producer.

For those 17 months Ed Rall was the only American living at Yongwol, a city of 3,000 Koreans. He was assigned there by the United Nations Economic Coordinator to rehabilitate the old Japanese-built Yongwol Power Plant which had been crumbling away through

KOREAN HOUSE is Rall's home. Cook and driver are natives of Yongwol village and live in their own houses

U. S. AND KOREAN technicians inspect tension mechanism at end of an eight-mile cable that hauls coal to plant

DAY SHIFT goes off duty at plant. With 535 Koreans Ed Rall completely rehabilitated the plant in 17 months

HE DOESN'T SPEAK KOREAN, but he gets his ideas across in a pidgin English that the employees can understand

His 'Retirement'

rehabilitates forgotten Korean plants

disuse. Its switchyard was shot up during the Korean War and its power house flooded during occupation.

Rall speaks no Korean, but he had no problems showing the Koreans how to pull apart and clean all the machinery, boilers, and turbines.

Rall's big problem at the power plant was that "the Koreans were never taught anything during the Japanese occupation. They were not allowed to think for themselves." But he knew how to handle them: "To do the job, I worked right with them. I didn't stay up there high and mighty, afraid to get down into the mess."

Ed Rall, now in his ninth year of "retirement" with the U.S. International Cooperation Administration, returned in May for a visit to his home at Grosse Pointe, Mich. He was there just a month when he went back to Korea to rehabilitate more run-down power plants.

GUIDED TOURS of plant are organized for hundreds of school boys from whom future employees will be drawn

SUPERHEATER in one of eight boilers is repaired by Koreans. With new boilers plant can hit 100,000 kw

RALL CONFERS with American and Korean officials in his seldom-occupied office at the Yongwol Power Plant

Britain Plans Giant Synchrotron

AEA report also reveals progress in controlled thermonuclear field, increased output of CEA stations, light water reactor

Britain will build a huge cyclon-proton-synchrotron that will outstrip anything the U. S. or Russia has. It also has obtained "very high temperatures" in its nuclear research work, has doubled output capacity of Calder Hall types of stations (conservatively estimated), and will put a 5-Mw light-water reactor at its Aldermaston atomic weapons plant.

These facts were revealed in the Atomic Energy Authority's second annual report for the year ending March, 1956.

But the general tone of the report indicates that development is continuing without any startling highlights, although at an increased rate. Growing momentum of the research effort shows up in staff figures released for the first time. Following a 30% increase in scientific personnel alone last year, the total number of AEA employees is now 24,000.

Persistent questioning failed to obtain from AEA Chairman Sir Edwin Plowden what was meant by "very high temperature" or to what extent Britain now is engaged in thermonuclear research. Both Sir John Cockcroft, director of Atomic Energy Research Establishment, and Plowden appeared embarrassed and finally conceded that "we are doing all we can with what scientific manpower and equipment are available". Inference that neither was commensurate with the Russian effort was undeniable.

No Technical Reasons Cited

Neither Cockcroft nor Plowden would offer firm technical reasons for boosted heat ratings of later Calder Hall type sets, saying that this is not possible until industrial groups' bids are received in a few weeks. Indications were that the main factors would be thicker reactor-plate and higher carbon-dioxide pressures and other structural refinements.

The giveaway is the fact that the independent South Scotland Electricity Board has announced plans to build a 250-300-Mw station using two Calder Hall type reactors. This represents a 250% uprating.

Much interest is centered on the 6,000-7,000-million electron volts proton synchrotron for which design studies have been completed. Flux will be 100 times that of the world's largest, recently commissioned in the U.S.S.R. New focussing methods make a much smaller magnet possible with weight under 5,000 tons and less than 120-ft diam. First accelerator would be capable of 10-million v.

The report also refers to several outstanding research and development items, mostly in metallurgical field.

1. An ion exchange process for ore production developed by the Department of Scientific and Industrial Research has largely made possible the present extent of the uranium production program.

2. The switch from calcium to magnesium in the reduction of uranium tetrafloride and the adoption of continuous flow processing. A plant nearly completed will eliminate worker contact with metal. The switch leads to great cost reductions.

3. Problems associated with the increased size and vertical alignment of reactor cartridges such as at Calder Hall have been overcome by the use of new equipment.

The report also lists testing loops in the research reactors and the nature of research for assessment of both pressure water-cooled, and sodium graphite reactors competing for the phase-two stations. For the first time the Authority admits that the sodium graphite system now looks to be the choice.

AEC Okays Atom Plant Start

Atomic Energy Commission's issuance of a "conditional" construction permit to Power Reactor Development Co for a 100,000-kw, $40.5-million nuclear power plant has precipitated another Washington hassel.

The permit would allow the Detroit group to begin construction of a fast neutron breeder power reactor at Lagoona Beach, near Monroe, Mich.

But issuance did not have the approval of AEC Commissioner Thomas E. Murray and has drawn strong protests from Sen Clinton P. Anderson (D-N.M.), chairman of the Joint Committee on Atomic Energy, and committee member Rep Chet Holifield (D-Calif.). All question the proposed reactor's safety.

In voting against approval, Murray said the Advisory Committee on Reactor Safeguards has not modified its letter to AEC opposing the project at this time. Until it does so, he does not believe issuance is justified.

The letter said there was insufficient information available at this time to assure the reactor could be operated at the proposed site without hazard to the public.

AEC's conditional permit recognizes the safety aspect. In a letter to PRDC accompanying the permit, AEC said:

"The commission believes the safety problems associated with the reactor will be of a kind which can be resolved within a reasonable time. The commission regards the fast breeder program as very important and will use its best efforts to assist the company to resolve these problems as completely and as quickly as possible. However . . . in issuing this construction permit, emphasis is on the fact that it is a conditional one and that AEC can make no commitment to convert the permit to a license until it is satisfied on all safety matters."

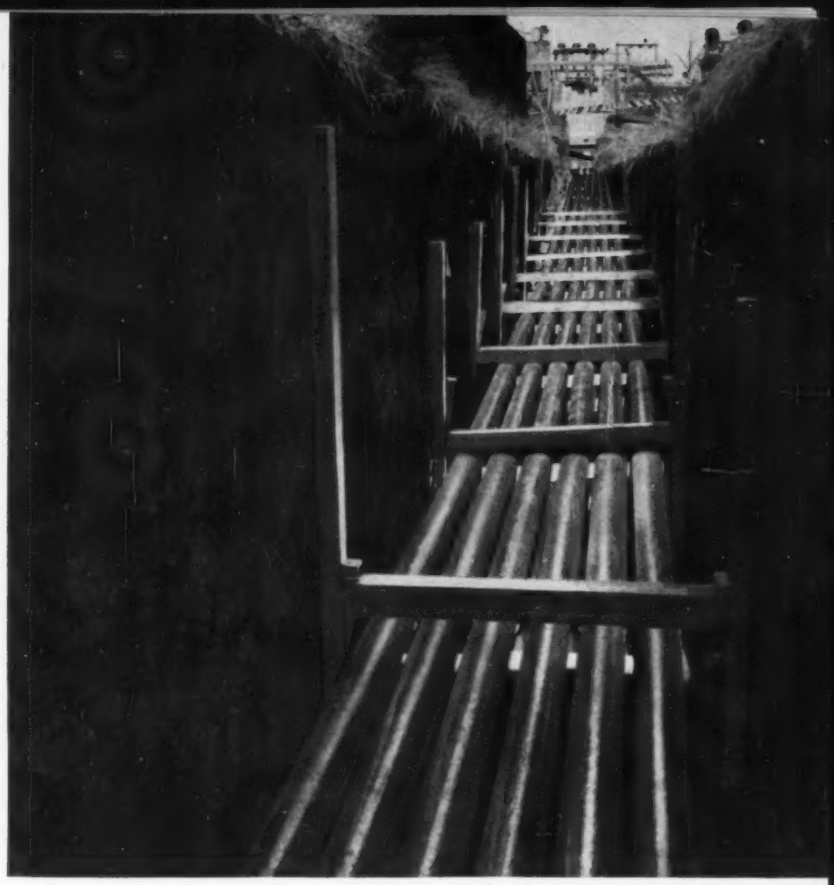
Anderson and Holifield have telegraphed Michigan's Gov Mennen Williams to halt construction of the project and have asked President Eisenhower to instruct AEC to withdraw the permit.

Detroit Edison Co's Pres Walker L. Cisler, who is also president of PRDC, has answered critics saying: "It would be unthinkable that we or anyone else would put in an atomic reactor not entirely safe."

Earlier, PRDC amended its license application to conform with questions raised on safety. Amendment said PRDC planned an extensive start-up test program to establish the reactor's safety or operation and recognizes that if it "should prove . . . to be unsafe at any time during such preliminary test period of operation, subsequent operation . . . must be deferred" until hazards questions are satisfactorily resolved.

L-M Permaline conduit can be shipped packaged in a sling. Here is a crane unloading 744 ft. of conduit at one time, saving hours of unloading time.

Lift truck is handling 512 ft. of conduit. L-M Permaline conduit is available on pallets to save handling. The time-saving is worth the slight additional cost.



L-M Permaline fibre conduit was used in 132 kv primary, 26.4 and 13.2 kv secondary duct runs for a large bulk substation. Permaline's smooth inner bore makes cable easy to pull, and reduces cable sheath abrasion.

Here's Why L-M's Permaline Conduit Is Easy To Handle, Easy To Install

Line Material makes it easy for you to handle Permaline fibre conduit in the material yard and on the job. For a slight additional cost, L-M packages the conduit in slings or on pallets for unloading in the material yard. This way large quantities of conduit can be unloaded in minutes with a crane or a lift truck. In the pictures above, a crane is unloading 744 ft. of conduit at one time, and the lift truck 512 ft. The next time you buy conduit, be sure to order L-M Permaline conduit in slings or on pallets and save hours of unloading time.

Permaline Is Laid Faster

L-M Permaline conduit also comes in long lengths. It is light, easy to handle on the job and in the trench. Joints are quickly and easily made by simply tapping the tapered couplings onto the tapered end of the conduit. Joints are watertight and safe from seepage of wet concrete and soil water. You'll find that Permaline conduit can be laid faster than many other types of duct.

Complete Line of Duct and Accessories

L-M Permaline conduit is available in 5-foot lengths, sizes 2, 4, 5, and 6 inches; also 8-foot lengths, sizes 3, 3½, 4, 4½, and 5 inches.

L-M has a complete line of accessories which include:

Spacers for any duct configuration.

Bends and angle couplings, including 5° angle couplings, S-bend, 45° and 90° bends.

Bell ends for use at conduit terminals.

Fibre caps to seal duct lines prior to drawing cable.

100% Salvage

L-M Permaline conduit can be cut with a hand saw. Smooth, precision tapers can be cut in the field with L-M's tapering tool, providing 100% salvage of field-cut ends.

Get Complete Information

L-M offers a completely engineered system for conduit installations. Ask the L-M Field Engineer for a copy of the 12-point plan folder, which shows how easy it is to use our system; or for Bulletin UG1A, which gives construction specifications. Or write Line Material Company, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

LINE MATERIAL

A McGRAW ELECTRIC COMPANY DIVISION

Permaline Fibre Conduit

BPI Bituminous Pipe Institute

This seal is your guarantee of recognized quality in Bituminous Fibre Conduit.

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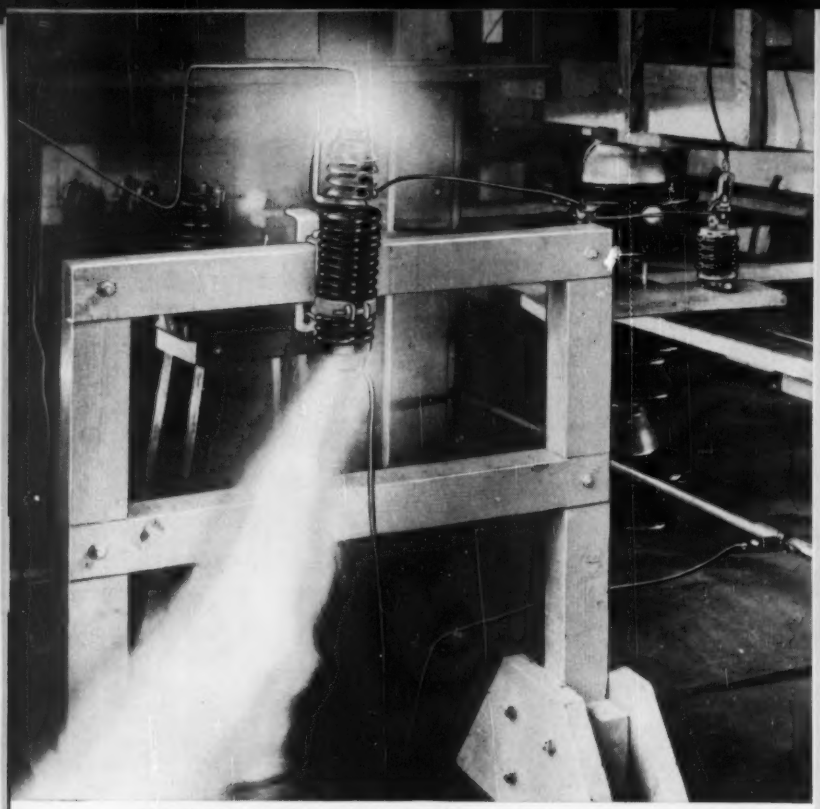
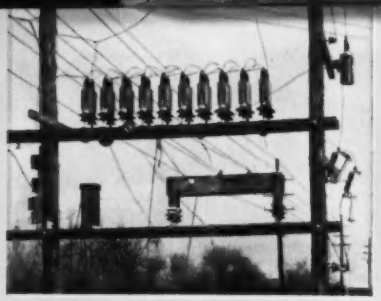


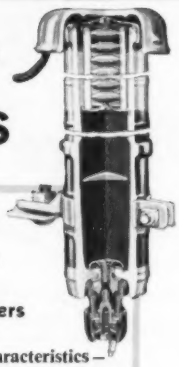
A LARGE NUMBER OF BLOWN FUSES WERE TRACED TO EXPULSION ARRESTERS. Photo shows one of the tests conducted by L-M engineers with the utility engineers that placed responsibility for the outages on the expulsion arresters.



EXTENSIVE FIELD TESTS were made by one utility to prove that *expulsion* arresters were satisfactory. But the evidence was the other way; the company continues to use *valve* arresters exclusively.

MANY COMPANIES ARE SWITCHING TO VALVE ARRESTERS because valve arresters provide a higher degree of protection. One company not only switched to valve type, but replaced every expulsion arrester on the system. Picture above shows lineman replacing an expulsion arrester with a valve arrester.

Why Valve Type Lightning Arresters Are Better Than Expulsion Arresters



By **GEORGE W. COOPER**
Product Manager
Protective and Power
Switching Equipment
Line Material Company

Line Material is frequently asked, "Which arrester principle is best for my system?" The answer is provided by operating companies who have tested and proved through field experience that *valve arresters are better than expulsion arresters.*

Regardless of differences in design by various manufacturers, there are certain basic differences in the valve *principle*, as compared with the expulsion principle.

The valve arrester operates on the principle of a valve, which "opens," with low resistance to high-voltage, high-current lightning surges, and "closes," with high resistance to 60-cycle follow current.

The expulsion arrester operates on the pressure principle, of expelling the power follow current arc. For this purpose fibre is used to form the gases which expel the arc. This fibre is subject to erosion—and changing characteristics. These limitations apply regardless of differences in design, manufacture, etc.

Listed at the right are four principal reasons why we recommend valve type arresters over expulsion arresters.

Get Complete Information

Details of some of the extensive evidence in favor of valve over expulsion arresters are given in a new booklet, "The Theoretical and Practical Aspects of Lightning Protection for Distribution Systems." Whichever type you use, we believe you'll be interested in this report. Ask your L-M Field Engineer for a copy, or write Line Material Company, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

FOUR REASONS for recommending valve over expulsion type arresters

1. Better Protective Characteristics—The valve arrester sparks over more quickly and at lower voltages on lightning surges.

2. Unlimited 60-Cycle Capacity—The application of the valve arrester is not limited by the available short-circuit current.

3. No Fuse Coordination Problems—The valve arrester will pass relatively small values of 60-cycle follow current, regardless of system capacity.

4. Longer Life—The valve arrester is electrically and mechanically unaffected in handling lightning discharges usually encountered in service. Its life is relatively unlimited.

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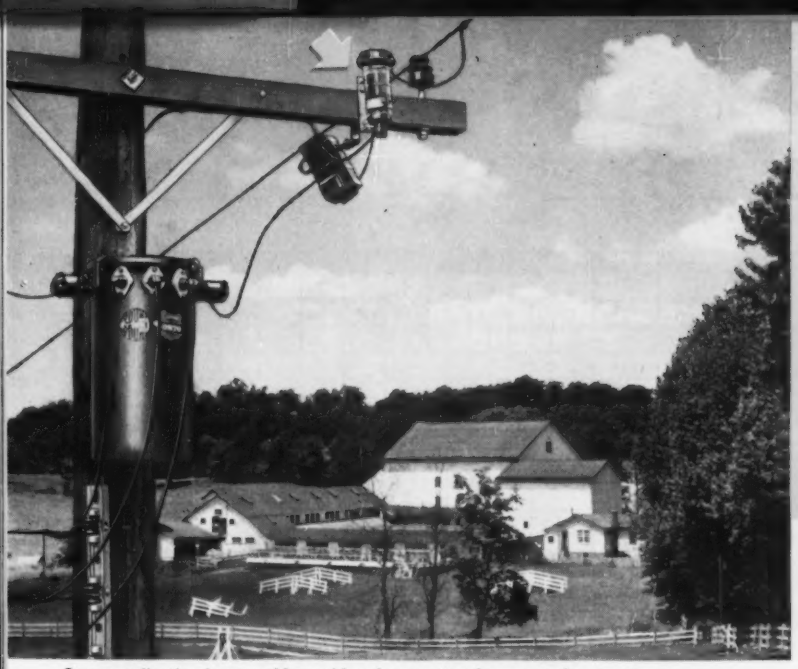
LINE MATERIAL Lightning Arresters

A McGRAW ELECTRIC COMPANY DIVISION



Fuse coordination is no problem with valve arresters because valve arresters pass very small values of follow current, regardless of system capacity.

Valve Arresters Permit Better Fuse Coordination

. . . Another Reason Why Valve Arresters Are Better Than Expulsion Arresters

by **H. V. DRYER**
Chief Engineer
Protective Products
Line Material Company

When you compare the operations of valve and expulsion arresters, you will see why there are so many fuse outages following a lightning storm on lines with expulsion arresters. And why, although we make both types, we at L-M say that *valve arresters are better than expulsion arresters.*

Expulsion Arresters

The oscillograms at right above show typical examples of power follow current through a valve and an expulsion arrester. With the expulsion arrester in this case, all sectionalizing fuse links must be able to handle 3100 amperes for at least a half cycle. Such fusing gives reduced short-circuit protection and greatly increases the problem of fuse coordination.

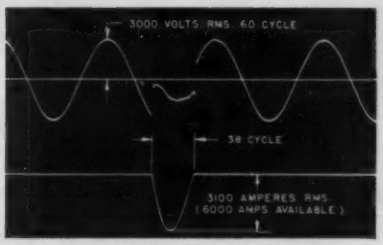
In addition, the magnitude of power follow current passed by an expulsion arrester will continue to increase because the fibre expulsion tube erodes as the result of each operation. This could eventually cause fuses to blow every time the expulsion arrester operates.

Valve Arresters

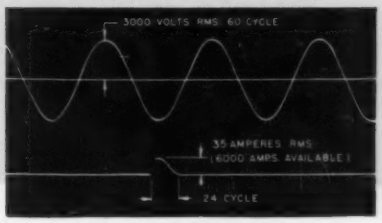
Fuse coordination is no problem with valve arresters, because they pass only relatively small values of follow current regardless of the system capacity. This is true for the life of the arrester.

Get Complete Information

Details of some of the extensive evidence in favor of valve over expulsion arresters are given in a new booklet, "The Theoretical and Practical Aspects of Lightning Protection on Distribution Systems." Whichever type you use, we believe you'll be interested in this report. Ask your L-M Field Engineer for a copy, or write Line Material Company, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

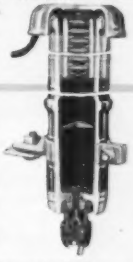


3 KV EXPULSION ARRESTER



3 KV VALVE ARRESTER

The oscillograms show the operation of typical expulsion and valve arresters handling a lightning discharge with 6000 amperes fault current available. The expulsion arrester, top, draws 3100 amperes follow current; the valve arrester, bottom, draws only 35 amperes. If expulsion arresters are used, all sectionalizing fuses must be heavy enough to handle 3100 amperes for at least a half cycle. However, if valve arresters are used, much smaller fuses can be installed, and coordination poses no problem.



FOUR PRINCIPAL REASONS

for recommending valve over expulsion type arresters

1. Better Protective Characteristics—The valve arrester sparks over more quickly and at lower voltages on lightning surges. Transformer end turns are not stressed by a complete voltage collapse following sparkover. Although the expulsion arrester provides a satisfactory level of protection for most transformers, a higher degree of protection is available through the proper application of valve arresters.

2. Unlimited 60-Cycle Capacity—The application of the valve arrester is not limited by the available short-circuit current. The expulsion arrester, operating on a pressure principle, has a definite top limit and may have a bottom short-circuit current rating. (Too much current causes it to explode; too little fails to expel the arc.)

3. No Fuse Coordination Problems—The valve arrester will pass relatively small values of 60-cycle follow current, regardless of system capacity. Expulsion arresters can pass high follow current which may cause unnecessary operations of sectionalizing devices.

4. Longer Life—The valve arrester is electrically and mechanically unaffected in handling lightning discharges usually encountered in service. Its life is relatively unlimited. The expulsion arrester ages and changes its characteristics, because the fibre is affected by both atmospheric conditions and erosion caused by operation.

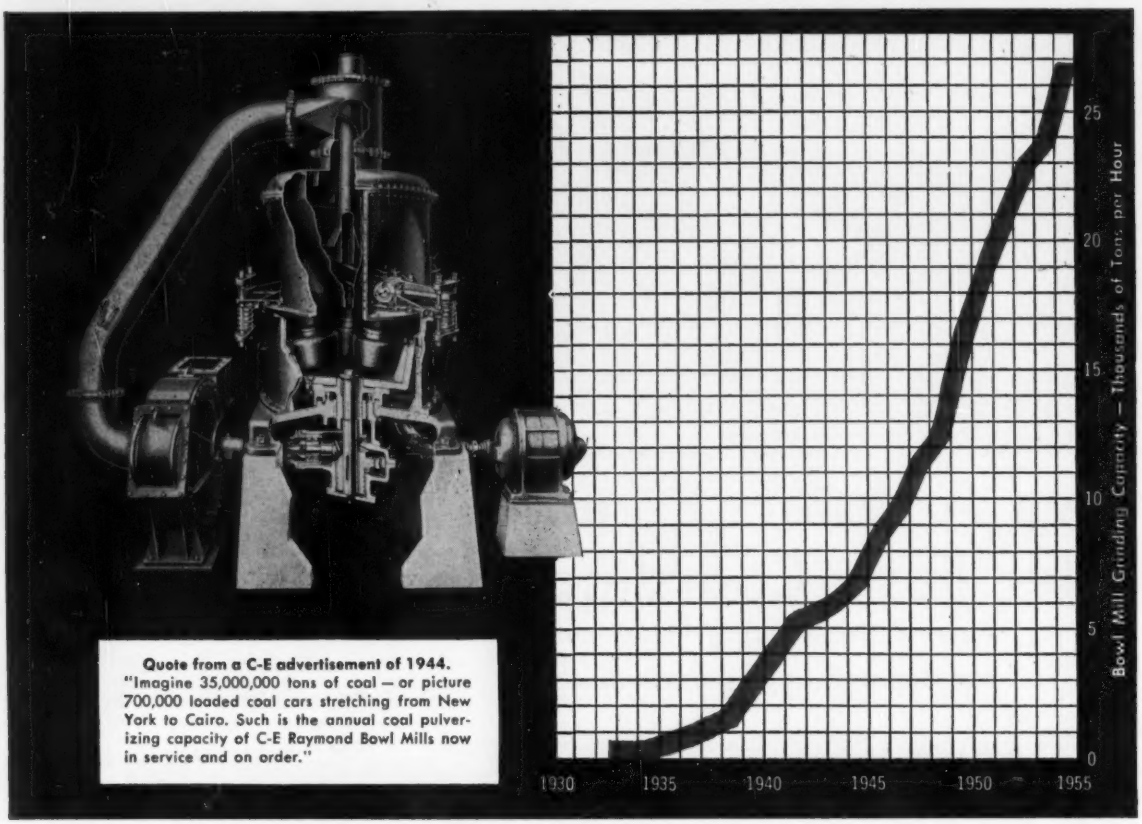
LINE MATERIAL

A McGRAW ELECTRIC COMPANY DIVISION

261

LM Lightning Arresters

A NEW LOOK AT A NOTABLE RECORD


Quote from a C-E advertisement of 1944.
"Imagine 35,000,000 tons of coal — or picture 700,000 loaded coal cars stretching from New York to Cairo. Such is the annual coal pulverizing capacity of C-E Raymond Bowl Mills now in service and on order."
Bowl Mill Grinding Capacity — Thousands of Tons per Hour
0
5
10
15
20
25
1930
1935
1940
1945
1950
1955

When the paragraph quoted above was written in 1944, the C-E Raymond Bowl Mill had been on the market just 10 years. Obviously it had achieved tremendous acceptance in the power generation field. But see what has happened since. Those 700,000 cars have grown to 2,850,000* which, in a single train, would more than encircle the earth at the latitude of New York.

No one factor could possibly account for this widespread acceptance. Rather it is the fact that the Bowl Mill's record of performance in many hundreds of installations has been outstanding in all these important respects...

- **power consumption**
- **maintenance costs**
- **control characteristics**
- **ability to maintain capacity with wet coal**
- **ability to maintain fineness through life of grinding elements**
- **quiet vibrationless operation**

The Bowl Mill's top performance on *all* these counts is the reason why utility engineers continue to accord it such widespread preference.

*Equivalent of 27,200 tons per hour shown on chart.

B-912

COMBUSTION ENGINEERING

C-E

Combustion Engineering Building
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Steam Generating Units • Nuclear Reactors • Paper Mill Equipment • Pulverizers • Flash Drying Systems • Pressure Vessels • Home Heating and Cooling Units • Domestic Water Heaters • Soil Pipe

To encourage provision of utility easements in early stages of land development . . .

Detroit Fosters Easement Planning

MANAGEMENT
Planning

Surveyors, planning consultants, FHA officials, county and municipal governments cooperate with utilities to develop guide to easement planning for utility services

J. B. TINETTI, Division Planning Engineer Eastern Michigan Division
D. G. WARREN, Special Agent Real Estate and Rights of Way The Detroit Edison Co

Rapid development of suburban areas, and today's trend in subdivision planning away from rectangular lots and blocks to the newer pattern of curvilinear blocks has accentuated problems of utility construction and rights-of-way. In fast-developing areas there has been a general lack of awareness by municipal officials and newer land developers of the need for and benefits of planned utility easements. There has also been a lack of utility information on this subject.

To meet this lack of utility information, the Detroit Edison Co has developed an Easement Planning Program for Southeastern Michigan working in cooperation with land surveyors, planning consultants, FHA officials, municipal and county governments and telephone representatives. Outgrowth of the program was development of a Utility Easement Guide compiled by the cooperating group, now in widespread use throughout the company area. Recently some tentative planning ordinances have quoted literally from the Guide.

Speeds Plat Planning

The Guide represents a convenient and fast method for handling preliminary plats between the land developers and the Michigan Bell Telephone Co and Detroit Edison Companies. In a not too involved fashion it spells out a set of rules that govern good utility easement design. It also explains the need for, and the advantages of, cooperation between land developers and utilities.

During 1955, the first full year of operation of the Easement Planning Program, Edison received 672 plats covering approximately 60,000 lots. This is 95% or more of the new plats recorded, or in process of being recorded, in Detroit Edison territory. Full cooperation has been given by 111 of the 125 surveyors or land developers involved. The remaining 14 were classed as uncooperative in more or less degree. Special effort is being directed towards this group, looking for reasons and for better understanding.

The easement Guide provides a source of information heretofore unavailable, to municipal officials and to others becoming newly involved in the sub-dividing of land. We believe it has helped to create an awareness of utility easement needs, before the start of mass subdivision. Municipal bodies have helped. On numerous occasions municipal authorities have advised developers to make arrangements for utility easements in connection with preliminary plats.

For several years prior to the development of the program, representatives of the right-of-way department and the sales department had been doing a great deal of work on a personal basis with developers, planners, engineers and municipal agencies in order to show these groups the mutual benefits to be derived from providing and designing utility ease-

ments before plats were recorded or more ideally while the plats are in the planning stage. While fair results were obtained, the increasing volume of new plattings it became apparent that a more comprehensive and uniform approach was needed.

A meeting of interested parties was called in September 1953. In attendance were representatives of:

- Committee of Standards Michigan Society of Registered Land Surveyors Southeastern Michigan Chapter
- Planning consultants active in Southeastern Michigan
- Federal Housing Authority
- Oakland County Road Commission
- Wayne County Track Index Department
- Michigan Bell Telephone Company
- Detroit Edison Company

Representatives of the Michigan Bell Telephone Company and of the Detroit Edison Co presented a detailed explanation of their problems and needs and recommendations towards more inclusive planning. The statement of the problems with respect to utility easements was well received by the group and it was agreed that there was a need for further examination of the matter.

A subcommittee comprised of one representative from each group was assigned to study the problem and recommend solutions. The subcommittee was asked to report back in six months. Possible approaches agreed upon were:

- Improved coordination of preliminary plat presentation to various interested groups. (Michigan Bell Telephone and Detroit Edison Company and others)
- Presentation of utility easement planning data in pamphlet-guide form.
- Recommendations of easement design to major plat review and acceptance boards.

Outgrowth of the subcommittee work was the easement Guide titled "Easement Planning for Utility Services" that was approved by the main committee in July 1954.

These meetings considerably furthered an understanding of problems, achieved a high degree of cooperation and secured an official sanction of the Guide which is now the key to the program.

Initially the utility easement Guide was distributed by mail to all Registered Land Surveyors in the State of Michigan, beginning in September 1954, accompanied by a letter signed by Herbert S. Hicks, president, Southeastern Chapter, Michigan Society of Registered Land Surveyors.

Guide Proves Popular

Within a few months after publication of the Guide, requests were received from the University of Michigan and Michigan State University for copies. We were given to understand that the principles and methods involved would be incorporated in general form in course material relative to land planning. Requests have also been received from out of state schools and various municipal units within and without our territory, and from interested utilities throughout the country. We have been informed that the Federal Housing Administration has established copies of the Easement Guide in regional offices as part of the established land planning references. Mention was made of the Guide in the December 18, 1954 newsletter of the American Society of Planning Officials.

The favorable reaction from such varied sources confirmed our original premise that a fair and positive approach to the problem of utility easements could lead towards better solution of the problem.

The benefits accruing from this easement planning program are numerous.

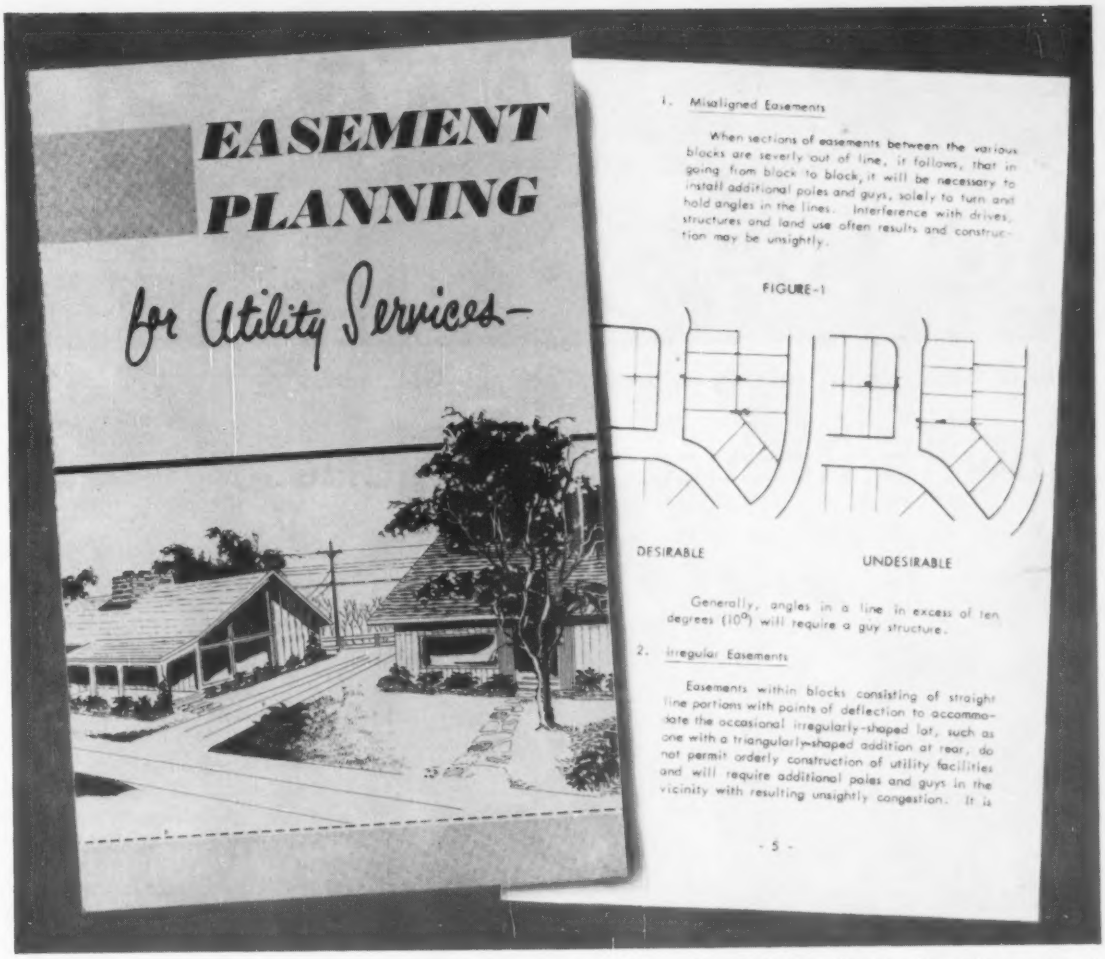
There are substantial savings through the large decrease in volume in rights-of-way necessary for local distribution lines. With easement planning rights-of-way have been provided, in major portion, by recorded easements.

On the basis of utility recommended easements we have been able to plan and build better and coordinated systems of local overhead distribution. This will have a favorable effect on cost and quality of line extensions.

This system of planned recorded easements results in improved relations with customers, reducing as it does the incidence of misunderstandings as to necessary locations for service lines and reactions to certain rights of way requests. It also clarifies our rights to remove and trim trees within easements.

The time interval between preliminary plats and final recording will average from six to twelve months. Generally the system of receiving preliminary plats provides substantial ad-

ARRANGEMENT FOR PROPERTY and easements for this new substation site were made with area developer in accord with Easement Planning Program developed by Detroit Edison. Substation was installed in mid-1955


EASEMENT
PLANNING
for Utility Services–
1. Misaligned Easements
When sections of easements between the various blocks are severly out of line, it follows, that in going from block to block, it will be necessary to install additional poles and guys, solely to turn and hold angles in the lines. Interference with drives, structures and land use often results and construction may be unsightly.
FIGURE-1
DESIRABLE
UNDESIRABLE
Generally, angles in a line in excess of ten degrees (10°) will require a guy structure.
2. Irregular Easements
Easements within blocks consisting of straight line portions with points of deflection to accommodate the occasional irregularly-shaped lot, such as one with a triangularly-shaped addition at rear, do not permit orderly construction of utility facilities and will require additional poles and guys in the vicinity with resulting unsightly congestion. It is
- 5 -

UTILITY EASEMENT GUIDE helps land planners and municipal government representatives understand easement problems. Desirable and undesirable planning for utility easements are shown and rules of good easement design given

vance notice as compared to first notification by means of receipt of the recorded plat.

This period of advance notice has distinct advantages in itself. Our system of returning preliminary plats to the land developer through our sales department provides an excellent opportunity for an early estimate of extent and schedule of potential new business. Sales coordination and promotion can be effected early. Right of way incidental to the main easement system and tree removal and trimming rights are usually discussed and often arranged for at this same time. Delays in new services are avoided.

Advance notice on large projects makes it possible to do a better job of distribution system planning on the basis of an earlier, more comprehensive view of suburban development.

We have been able in several instances to provide beforehand for necessary sub-transmission routes.

We have been able in several instances to secure properties for new substations in areas in the process of being newly subdivided before zoning and subdivision restrictions, which would have ruled out this use, had been applied to the final plat.

Results Excede Expectations

Results of our Easement Planning Program to date have more than met our most optimistic expectations.

One of the prime requirements for the continuing success of this program is promptness in the handling and return to the developer, of preliminary plats submitted to the utility for easement design. Delays and inconvenience to the developers must be avoided. This privilege of design of utility easements must be administered fairly and honestly. A fair balance between the interests of the utility on the one hand and of the owners and future occupants must be maintained.

Continuing effort, and contacts with the occasional uncooperative developer and with the new developer as he appears upon the scene, are necessary. We are continuing our efforts in the local municipal areas as opportunities for presentation of our program occur. The very fact that such a large percentage of developers in our area are cooperative on a voluntary basis has given considerable impetus to the program in municipal areas.

With a "shoemobile" touring its area, Cincinnati G&E shows . . .

How to Reduce Foot Injuries

EMPLOYEE IS FITTED with safety shoes. J. H. Heimbrock, superintendent of Miami Fort Station, examines shoes in truck doorway while J. E. Clore looks on

When utility makes it easy to buy safety shoes, foot injuries show marked decline

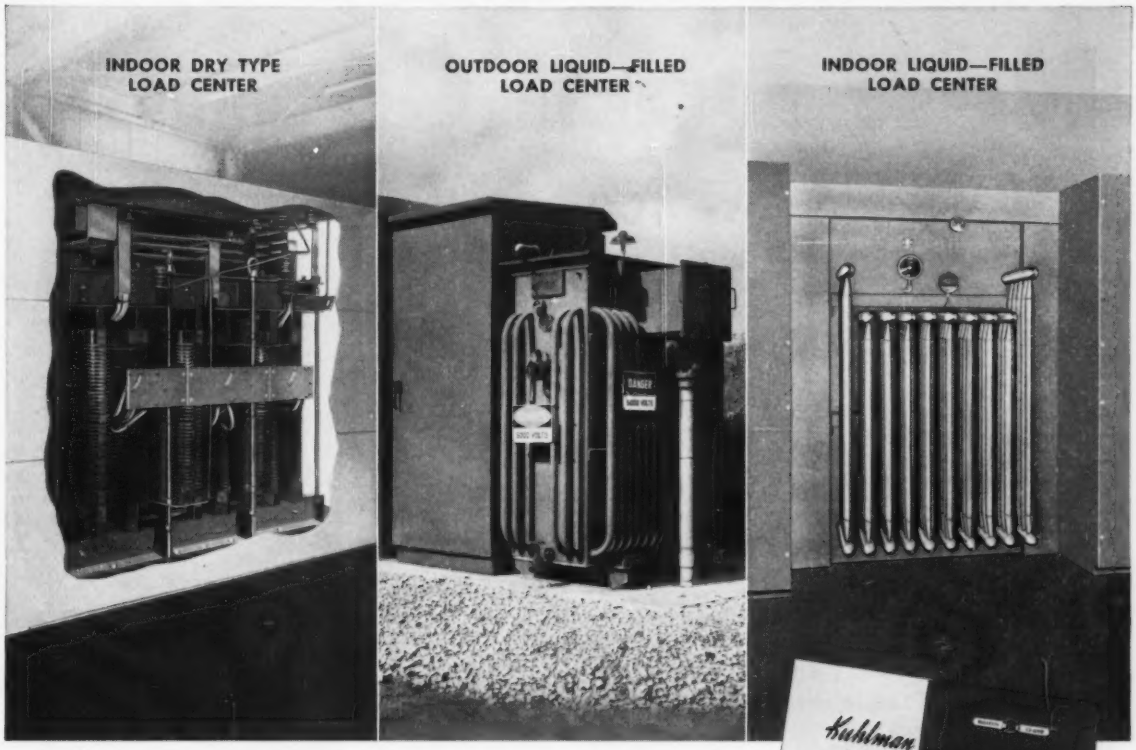
Cincinnati Gas & Electric Co has greatly reduced foot injuries to employees by making it easy for them to buy their safety shoes.

The shoes are brought to the employees by "shoemobiles"—large trucks with a complete stock of safety shoes. The shoemobiles, owned by an industrial shoe-service company, travel throughout Cincinnati G&E's area in the spring and fall of each year on a pre-arranged schedule.

This service brings safety shoes right to the generating stations and outlying districts where the complete transaction is made and the merchandise is delivered. Since the shoemobile program was started, many hundreds of CG&E employees have invested in foot safety.

THREE TYPES OF SAFETY SHOES OFFERED BY "SHOEMOBILE"

NEW BULLETIN ON LOAD CENTERS SHOWS 3 WAYS TO REDUCE POWER LOSSES AND LINE DROP



Now you can get complete technical information on Kuhlman's three basic load center designs. For both indoor and outdoor service, they are ideal for all types of industries, commercial buildings or special job requirements. Compact, safe, modern—they can be installed near the center of the load. Thus, long secondary runs are eliminated and power losses reduced. This improves voltage regulation . . . increases lighting efficiency . . . makes motors easier to start.

Choose the Kuhlman load centers that fit your needs. Standard components provide numerous circuit combinations for either indoor or outdoor installations. This new Kuhlman reference bulletin, CS-1000, will give you all the facts. Get your copy—simply send the coupon below.

KUHLMAN
ELECTRIC COMPANY

5614

KUHLMAN ELECTRIC CO.—1002 26th St.—Bay City, Mich.

Gentlemen: Please send me the new bulletin, CS-1000, on Kuhlman Load Center Transformers.

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

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Allis-Chalmers . . . for Leadership in

Philadelphia Electric Company
Eddystone Station to Get

New Dual Cooling

for 400,000-Kva

Transformer Bank

Permits one transformer to carry practically entire load if second unit is out of service

This dual-cooled twin transformer arrangement is believed to be the first of its kind in the world.

Twin 200,000-kva Allis-Chalmers power transformers are to be used with a cross-compound steam turbine. Under normal conditions they will jointly take the full load.

Half the *Electro-Cooler* units provided will serve each transformer. But if one transformer is removed from the line and power is switched to one unit, all *Electro-Coolers* will remove heat from the one active transformer.

With the trend to higher kva ratings in transformers, use of twin units will simplify transportation, handling and installation. And single-phase reliability can be provided in three-phase equipment.

* * *

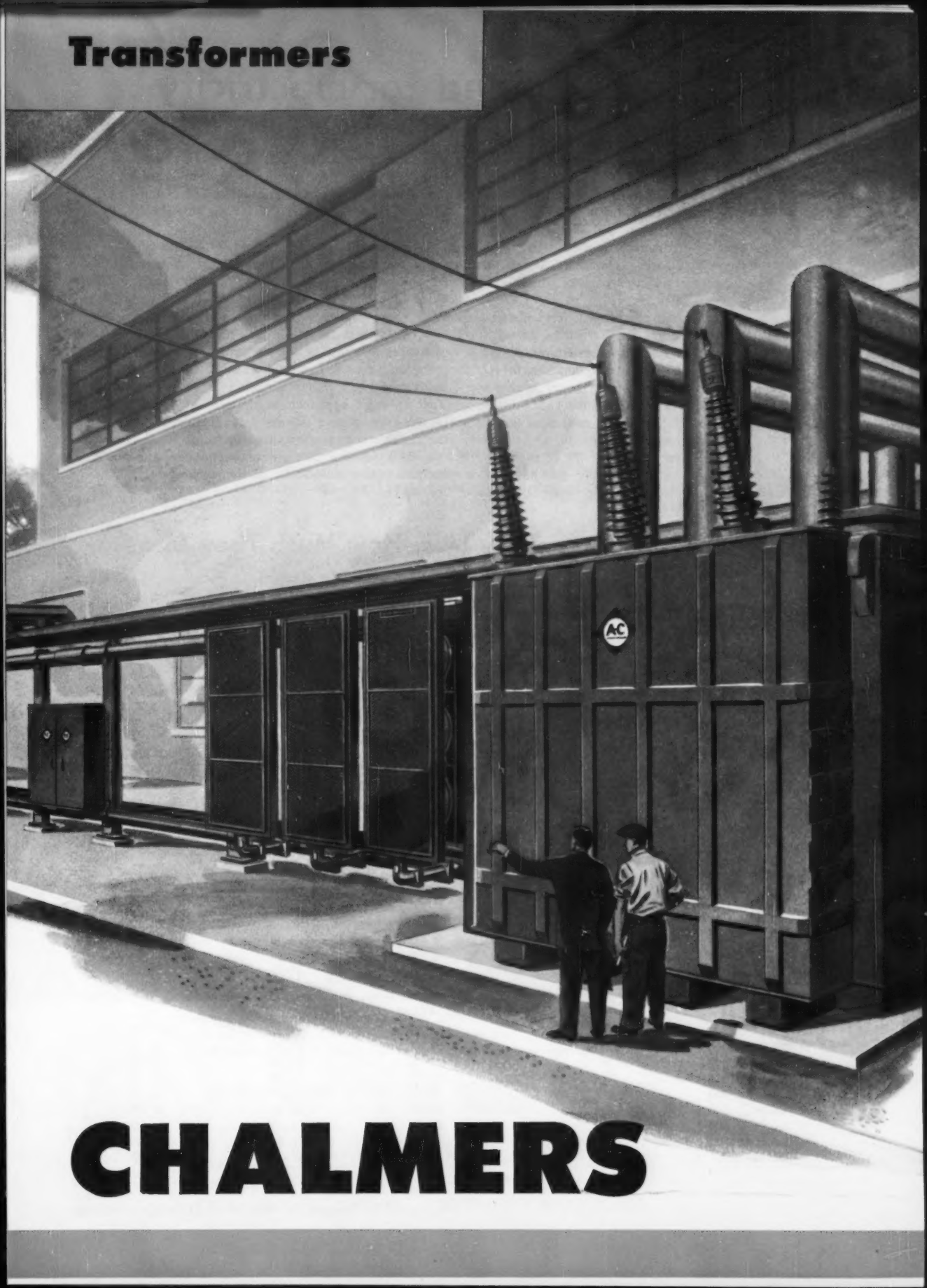
This is only one of many examples of Allis-Chalmers leadership in transformers. For further information about this interesting new development, call your nearest A-C office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

A-C ALLIS-CHALMERS

A-5132

ALLIS-

Transformers



CHALMERS

What People Spend for Electricity . . .

• The higher a family's income the more it spends for electricity—most likely because the higher income groups own more appliances.

• Suburbanites and residents of small cities generally spend more for electricity than do city dwellers. Probable reasons: 1. Many suburban and small city regions are off gas mains: 2. Apartment dwellers who are less likely to own such appliances as washers, dryers, and water heaters make up a large part of the big city population.

These are conclusions to be drawn from the table below. The data comes from the Bureau of Labor Statistics' 1950 survey of consumer expenditures—possibly the biggest statistics gathering job yet done on the U.S. consumer. To get its information on people's spending and saving habits, the bureau queried some 12,500 families in 91 cities and towns. It has taken until now for it to ready its findings for release.

Some other observations:

• High-income Southerners generally purchase more electricity than do their Northern and Western counterparts. But Southerners in the lower income brackets spend less than do their economic cousins in other regions. Both the highest and lowest expenditures are found in the South—$127.06 for the small city family earning $10,000 or more, and $10.37 for the suburbanite earning less than $1,000.

• The middle income groups ($4,000 to $6,000) are fairly consistent in their spending in all three regions. Expenditures range from the $40-$50 levels in large cities to around $70 in the small cities, except in the West where small city spending is not so great.

• The highest income groups make 10 times or more money as do those at the low end of the scale, yet they spend only four to five times as much for electricity. This lends weight to a contention held by many in the industry: That is, high appliance saturations, as to be expected in the high income groups, bring higher revenues. But the sizeable increases expected in future years can come only by promoting the high-use, temperature-affected loads such as the heat pump, air conditioning, and electric heating for the entire home.

. . . Depends on Where They Live, How Much They Make

Average Annual Expenditure by Income Class

Income Class	Large Cities	Suburbs	Small Cities
In the North			
Under $1,000	$20.12	$23.38	$32.95
$1,000 to $2,000	21.61	36.39	26.33
2,000 to 3,000	30.34	39.77	43.06
3,000 to 4,000	36.48	47.68	56.73
4,000 to 5,000	45.14	49.53	66.94
5,000 to 6,000	50.68	57.24	72.54
6,000 to 7,500	48.77	61.03	71.28
7,500 to 10,000	60.28	55.17	100.66
10,000 and over	69.14	90.52	113.57
In the South			
Under $1,000	$15.98	$10.37	$27.51
$1,000 to $2,000	18.11	28.77	30.07
2,000 to 3,000	24.24	43.50	39.42
3,000 to 4,000	35.25	55.94	58.08
4,000 to 5,000	41.80	59.82	71.85
5,000 to 6,000	51.11	59.23	74.27
6,000 to 7,500	58.06	62.33	85.03
7,500 to 10,000	73.81	73.12	105.14
10,000 and over	79.16	64.92	127.06
In the West			
Under $1,000	$17.33	$23.50	$19.71
$1,000 to $2,000	19.37	29.08	26.45
2,000 to 3,000	25.76	32.55	32.80
3,000 to 4,000	35.15	40.50	42.80
4,000 to 5,000	42.33	51.81	54.28
5,000 to 6,000	46.20	50.85	49.74
6,000 to 7,500	53.19	54.15	64.82
7,500 to 10,000	60.92	41.96	69.45
10,000 and over	63.92	57.44	67.27

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SERVICE BODIES

THAN ANY OTHER MAKE

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Powers-American can furnish the *just right* body for any service job—standardized for greatest economy . . . modified-standard, to fit individual job needs . . . custom-made, to meet specific operating requirements.

Whether you have one truck or the largest fleet . . . you'll find it worthwhile to get details from Powers-American next time you need service bodies for your operation.

SERIES 350 Bodies have an under-floor winch, a fold-over derrick, and an extension ladder. Compartments are equipped to carry a variety of service tools, parts, and materials.

SERIES 25 Bodies are available in standard models equipped specifically for telephone, electric, gas, or water meter installation and service.

SERIES 44L Bodies have same construction features as Series 44 Bodies described above . . . plus a shelf-equipped superstructure, available with or without roof.

SERIES 450 Bodies, designed for light duty construction and maintenance work, are equipped with a revolving aerial ladder, an underfloor winch, and an easy-to-use derrick.

SERIES 44 Bodies . . . in 75", 90", and 104" lengths . . . are designed for service work in any phase of the utility industry. Equipped with bins, racks, material hooks, and adjustable shelves. Available with optional items to fit individual work needs.

Descriptive literature and price information is yours for the asking

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Donald S. Kennedy

Chas. E. Oakes

Col. H. S. Bennion

EEI Unit to Discuss PR, Load Growth

Kennedy, Oakes, and Bennion are featured luncheon speakers at Ninth Annual Round Table Conference on Labor

Communications, load growth, and public relations will be discussed by the luncheon speakers at the Ninth Annual Round Table Conference sponsored by Edison Electric Institute's Industrial Relations Committee. It will be held at the Drake Hotel, Chicago, Ill., on Sept. 17-19.

Kennedy: Combat Misinformation

Donald S. Kennedy, president of the EEI and Oklahoma Gas & Electric Co, will speak Sept. 17 on the importance of each company's developing and maintaining a communication and education system which will serve as an umbrella against propaganda and slanted attacks by socialistic enemies of the free enterprise system.

To be realistic about the problem of keeping the particular companies and the industry in general in a healthy condition, Kennedy points out, "one must realize that often much more serious difficulty is experienced in combatting misinformation and malicious mistatements leveled at the industry than is encountered in the actual business economics, financing and developmental work."

A continuing program of employee orientation and education, he believes, would not only provide a reservoir of instructors for the investor and customer group. It would also develop a substantial body of intelligent people to discuss the problems of the electric utility in casual meetings with the general public and with many other groups, particularly those who are paid from tax monies.

Oakes: Load Growth is Joint Effort

At the luncheon on Sept. 18 Chas E. Oakes, president of Pennsylvania Power & Light Co, will say that every major department in every utility has important responsibility in meeting the load growth. Close coordination between departments well in advance of the expected growth, he urges, is imperative.

He says that commercial, operating, financial, engineering, and construction departments must combine their efforts to forecast load growth by areas and by dates.

The industrial relations department, he declares, has an important role in cooperation with all of the others. It must help in the selection and training of an adequate and yet not excessive work force and preserve the stability and security that is traditional in our industry while developing the kind of flexibility within the work force that permits us to take full advantage of automatic operation, consolidation, and mechanization of our work function.

He further says that management must vigorously oppose all of those who would have the federal government move further into the power business.

Bennion: Start Building Today

Col. H. S. Bennion, former vice president and managing director of EEI, will tell the conference that "we must now, today, start building for a wider acceptance of the private power industry."

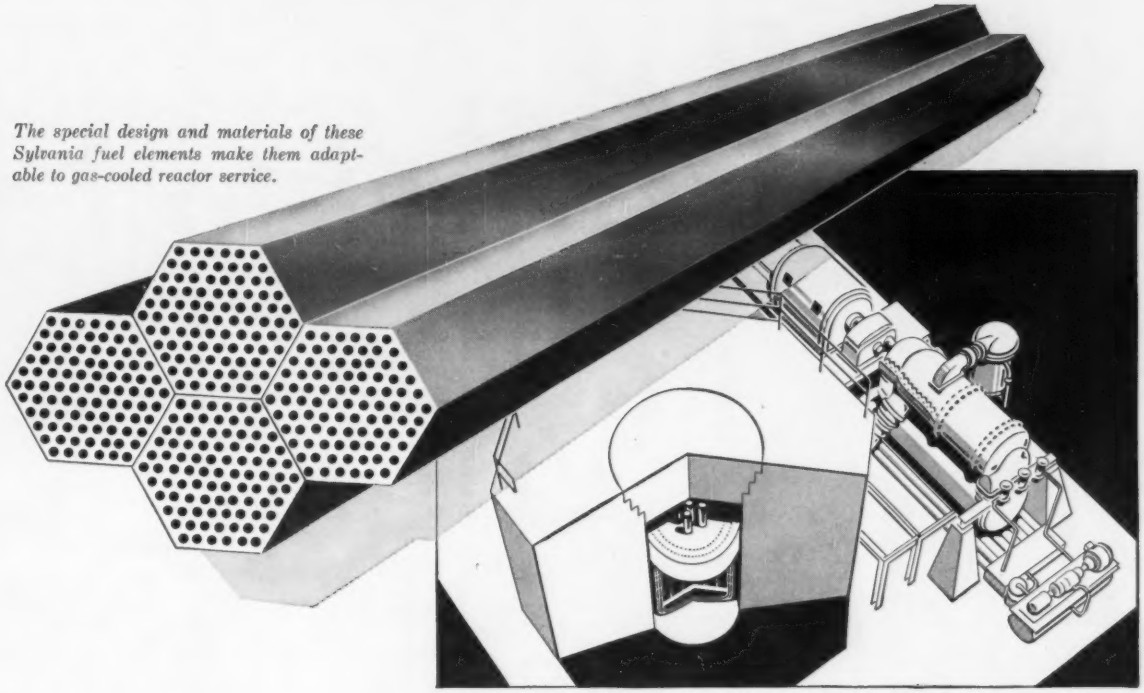
In answer to the question "Where will we be tomorrow?" he will say that we can be sliding farther behind or we can be going ahead. If we will build soundly in all the phases of our business, we shall gain the wider and wider acceptance of our business.

The overall theme of the conference is "Preparing Today for Tomorrow's Problems." Four keynote speakers will present four phases of the theme. After this has been done, conferees will discuss these topics in "How To Do It" groups.

The subcommittee of the Industrial Relations Committee is under the chairmanship of W. H. Senyard, Louisiana Power & Light Co. Other members are C. H. Campbell, Pacific Power & Light Co; H. F. Carr, Pacific Gas & Electric Co; E. M. Osta, Niagara Mohawk Corp; M. F. Osterling, Hartford Electric Light Co; and C. E. Parker, Commonweath Edison Co.

This conference is open to management personnel. For reservations, write E. S. Evans, secretary, Industrial Relations Committee, EEI, 420 Lexington Ave., New York 17.

The special design and materials of these Sylvania fuel elements make them adaptable to gas-cooled reactor service.



A typical closed cycle gas-cooled reactor power plant system design, utilizing a gas turbine translation unit. Drawing courtesy of American Turbine Corporation and Ford Instrument Company.

Gas-cooled reactors and high heat

...a problem in fuel element design

THE development of nuclear-powered gas turbines promises to open up important new fields of practical application for atomic energy. If postulated economies are realized, the gas turbine will prove to be an ideal mobile power source for oil tankers and other seagoing vessels. The gas turbine promises, also, to be an economical power source for small generating plants in the 5000 to 50,000 KW range.

To realize inherent economies, the gas turbine requires a gas-cooled nuclear reactor—a type that of necessity operates at high temperature. Fuel elements of customary design are unsatisfactory for this service because of the high operating temperatures encountered. To meet this problem, Sylvania has developed a series of special high-temperature elements that can be adapted to gas-cooled reactor service which calls for fuel operating temperatures of 1200 F and above. In metallurgy, and construction, these Sylvania high-temperature fuel elements are designed to withstand operating temperatures of up to 6,000 F.

If you would like to investigate the practicability of gas-cooled reactors for your own applications ... *remember that the key to economical operation is the fuel element and fuel reprocessing.* Our technical and scientific staff will gladly answer any questions you may have in this area. Write for your copy of: *Sylvania Atomic Fuels and Reactor Components.*

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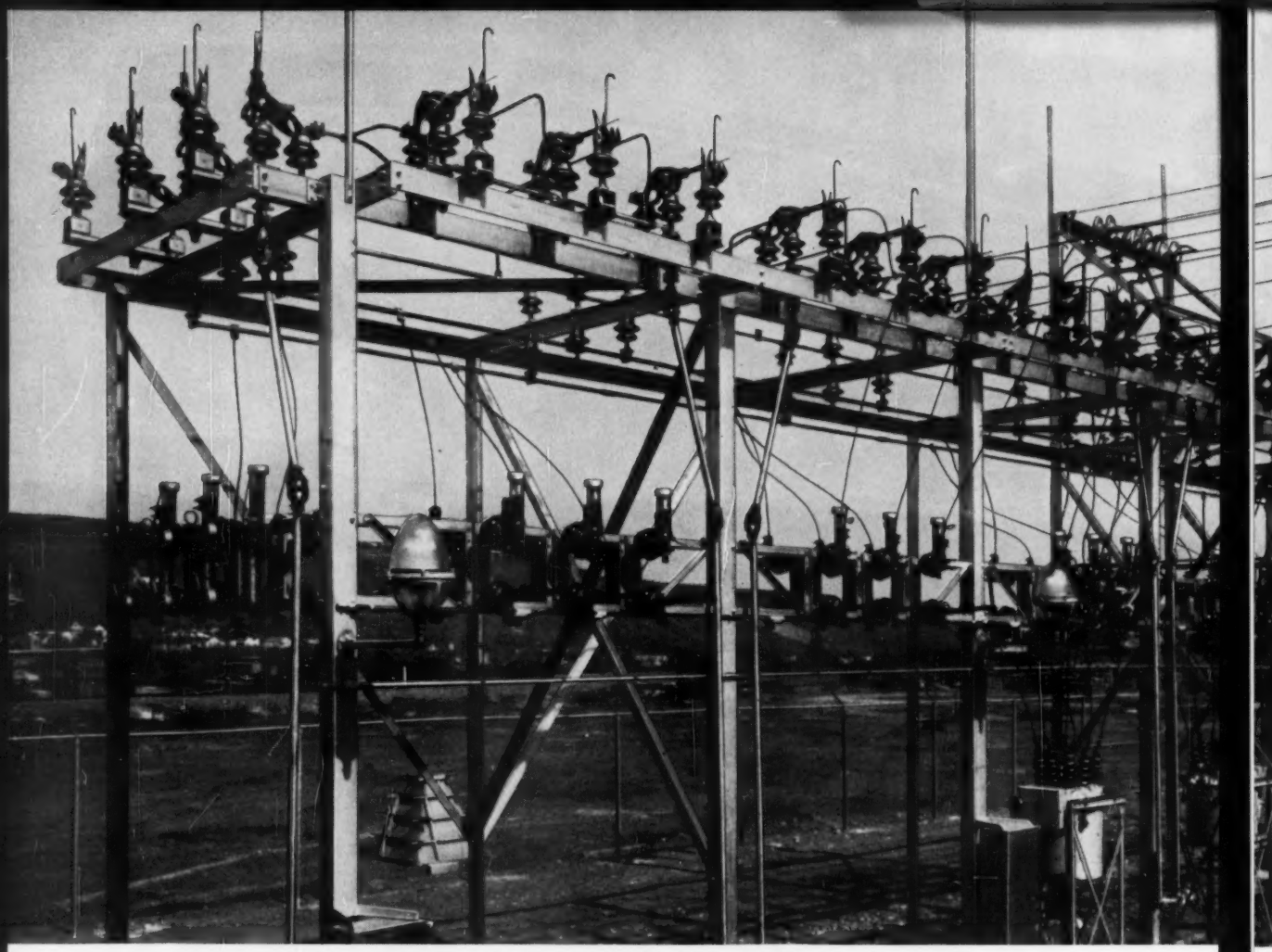
SYLVANIA®

ATOMIC ENERGY DIVISION

LIGHTING • RADIO • ELECTRONICS • TELEVISION • ATOMIC ENERGY



Nine L-M power switches and 20 hook switches at the 13.8 kv 20,000 kva switching center of a Northwest utility. L-M also furnished other equipment and apparatus.

How L-M Switch Design Insures High Thermal Capacity, Positive Operation

High-pressure silver-to-silver contacts provide cool operation; powerful lever advantage to open and close switch insures easy operation at all times.

by **HARVEY BAERWALD**
Sales Application Engineer
Power Switching And
Substation Section
Line Material Company

Line Material has designed high thermal capacity and trouble-free operation into its line of power switches. Powerful lever advantage of the operating mechanism and silicone-grease-lubricated and sealed bearings at all moving joints insure positive operation to open or closed switch position regardless of ice, corrosion, or long periods of non-operation.

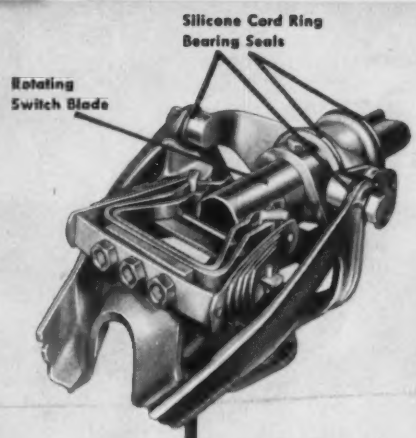
Tremendous Lever Advantage

Operating mechanism provides a tremendous lever advantage by utilizing unique rotating switch blade design. Before the blade even begins to rise in the contacts, it is rotated 26 degrees—the full force is applied to blade rotation, breaking any possible condition of ice, corrosion, or contamination.

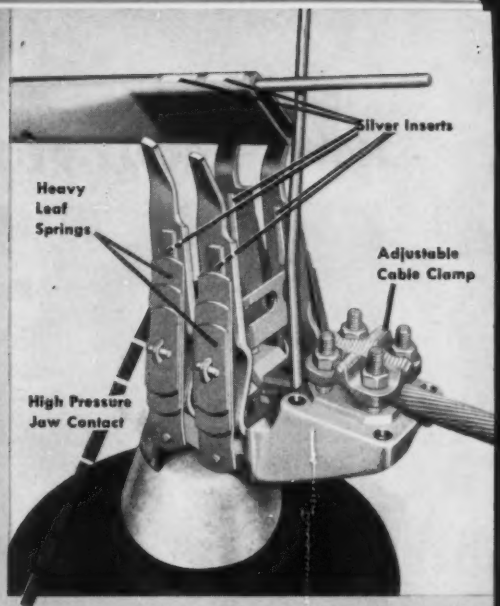
Smooth, Easy Operation

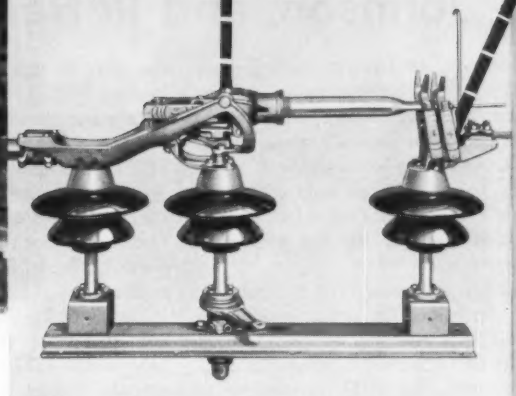
The hinge operating mechanism also provides smooth, positive blade rotation and blade rise. All bearings and all moving joints on the switch and on the interphase mechanism assembly are silicone-grease-lubricated for life and positively sealed with silicone cord rings.

LINE MATERIAL
A McGRAW ELECTRIC COMPANY DIVISION

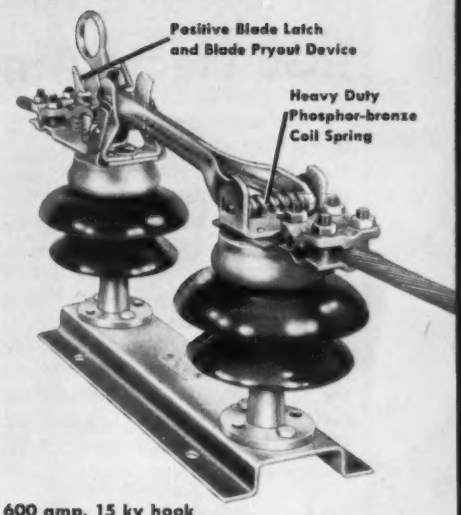


Hinge Mechanism showing
L-M outstanding features





1200 amp. 34.5 kv vertical break
type PV switch



600 amp. 15 kv hook
stick operated Disconnect Switch

Grease can't get out; water, dust, or dirt can't get in to freeze or start corrosion.

On 69 kv ratings and above, a counterbalance spring is provided to counteract blade weight. It is a self-centering, double coil, floating spring which is positive acting and trouble-free.

High Thermal Capacity

L-M's power switching equipment provides extremely high thermal capacity for both continuous current and short-time high current carrying applications.

Silver inlays in both blade and contact shoes insure high current-carrying capacity at both jaw and hinge contacts. During the closing operations, blade rotation provides a wiping action assuring clean silver-to-silver contact surfaces.

The jaw contact assembly has large copper shoes which exert 175 pounds pressure on the silver-to-silver contacts. This high pressure is maintained by heavy leaf springs to provide uniformly high thermal capacity.

L-M's power switches also have fewer current interchange points because the terminal connectors are designed as an integral part of the contact adapter.

Simple Construction

Turnbuckle interphase adjustments make L-M group-operated switches easy to install. Flexible interphase mechanism assures positive operation without periodic maintenance, even after the structure has become severely distorted.

Get Complete Information

Ask your L-M Field Engineer for information and bulletins on L-M's Power Switching Equipment. Or write Line Material Company, Milwaukee 1, Wis.

Power Switching Equipment

HOWARD ARNETT

HILBERT S. JOHNSON

ARTHUR J. PORTER

PGE Elects Arnett, Johnson, and Porter VP's

Three newly elected vice presidents of Portland General Electric Co are Howard Arnett, Hilbert S. Johnson, and Arthur J. Porter.

Arnett, who has been executive assistant to PGE Chairman Thomas W. Delzell for the past year, will now assume responsibility for the activities of the general sales manager, general manager of customers' service, and the general superintendent. A graduate of the University of Iowa, Arnett has been associated with the Oregon utility since 1936 in a wide variety of positions.

Johnson, an Oregon State College graduate, will be responsible for the operation of the company's six outside division offices and will work closely with Arnett on company-wide operating policy. He has been with PGE since 1937 and has served as general division manager for the past eight years.

Porter, a 23-year PGE veteran, will be responsible for power production and supply. Also a graduate of Oregon State, he has served in numerous positions until his 1952 promotion to superintendent of production. Earlier this year he was named power manager as well.

In other company changes, Carrol W. Brissenden, former sales manager of the Portland Division, has been appointed general sales manager for the entire system, and Wallace E. Gordon has been named to the newly created office of manager of industrial relations.

Duties of E. W. Bredemeier, Portland customers' service division manager, will be expanded to include those of general manager of the customers' service division.

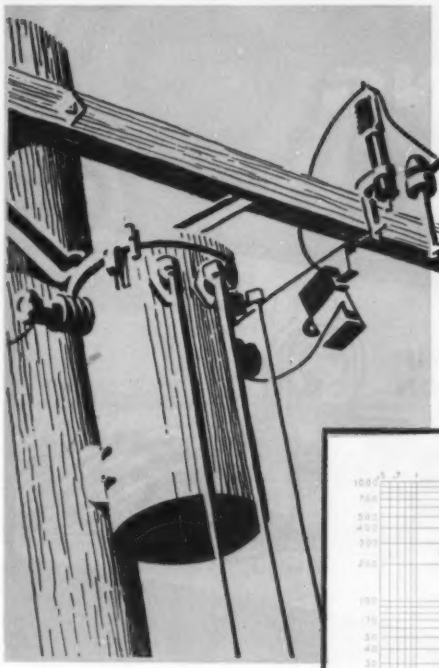
Smith is Appointed Secretary of Arizona PS

FRANCIS W. SMITH

Arizona Public Service Co has announced the appointment of Francis W. Smith as secretary of the company to replace Clarence A. Hulse. The latter retired as secretary and assistant treasurer July 31 after 40 years service with the utility and its predecessors.

Smith, who has served as comptroller of the company since 1952, is a veteran of 23 years service in the utility industry. He joined Arizona Edison Co, Inc, a predecessor of Arizona Public Service, in 1948, and served as treasurer until 1952. At that time Edison merged with Central Arizona Light & Power Co to form Arizona Public Service, and Smith was appointed comptroller of the merged company. Previous to his association with Edison, he served Southern Union Gas Co in various executive positions.

Although retiring from his former positions, Hulse will be retained with Arizona Public Service as a special consultant on financial and corporate matters.



NOW...

full overload capacity transformer protection

without unnecessary outages

NEW CHANCE SloFast Fuse Links follow the Safe Loading Curve

DUAL ELEMENT

SLOW

FAST

The Chance SloFast Fuse Link has two distinct current responsive elements: A slow element, made up primarily of a heater coil and soldered junction with insulated strain pin and ceramic tube; and a fast element constructed like the single element in a conventional fuse link.

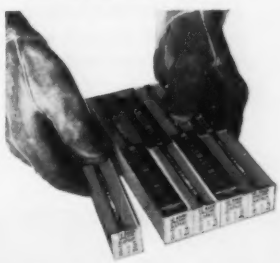
This exclusive Chance development gives more accurate, more positive overload capacity protection for distribution transformers than you could ever before obtain.

New Chance SloFast Fuse Links offer 3 advantages over the conventional type: full use of available transformer overload capacity without reducing transformer life . . . virtual elimination of transformer "burn-outs" due to overloads and secondary faults . . . increased continuity of service to your customers.

These fuse links are available in both universal buttonhead and open link styles in a complete range of sizes from 0.2 to 10.4 amps inclusive. All SloFast Fuse Links have ampere ratings identical with the full load ratings of the transformers they are designed to protect. Each fuse link comes in an individual container clearly labeled to show rating. Chance SloFast Fuse Links are sold by leading Electrical Wholesalers everywhere.

Write to A. B. Chance Company, Centralia, Mo., for new bulletin "FUSE LINKS AND HOW TO USE THEM." It contains performance curves and application tables for all distribution voltages.

PACKAGED FOR EASY REMOVAL



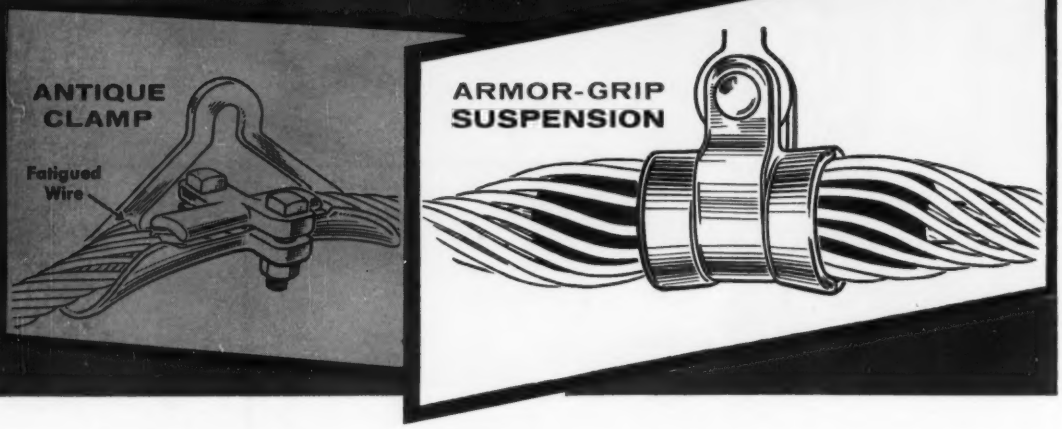
Linemen can remove links from containers without removing their gloves. A slight, firm twist separates the unit container from the 5-unit container. The end of each unit container is perforated for quick removal of the link.

A·B·CHANCE CO·

ABC INDUSTRIES

CF56-20

"PERFECTING not PERFECTION is our goal" *



"they both suspend the conductor, BUT . . ."

. . . *yesterday's answers* are not good enough. Today's will need improving tomorrow.

Take the problem of vibration fatigue. Failure of strand because of vibration or galloping does not occur in mid span. But it becomes a real problem at points of stress concentration, such as the end of the clamp keeper—at mass concentrations, such as at clamps, dampers and rigid splices—or at wearing points at loose attachments or fastenings.

Yesterday's answer—Preformed Armor Rods, introduced by Preformed Line Products Company in 1947.

Today's answer—PLP Preformed Armor with pitch direction the same as conductor strand and pitch length less than that of strand (Patent No. 2,609,653). When used in conventional clamps:

- it extends uninterrupted conductor life
- it eliminates wear possibilities
- it prevents excessive mass and stress concentrations

Tomorrow's answer is here today: the Preformed armor rod principle carried one step further in Preformed's ARMOR-GRIP SUSPENSION (Patent No. 2,722,393), the entirely new concept in suspension design.

The Armor-Grip Suspension Unit is a "floating suspension"—the conductor is cradled in neoprene and firmly gripped only by the custom-designed Preformed Rods which distribute their pressure over a relatively large area. The result: no wear possibilities—no mass concentrations—*and no clamping stress concentrations.*

This is another example of PLP research laboratories at work. Ever improving methods, materials and solutions is our goal. Call a PLP Representative today and ask for a demonstration.

* *John Dewey, "The Reconstruction of Philosophy"*

Made in accordance with or for use under one or more of the following U. S. Patents: 2,722,393; 2,275,019; 2,587,521; 2,609,653; 2,691,865; other patents pending.

PLP

PREFORMED LINE PRODUCTS COMPANY
5349 ST. CLAIR AVENUE • CLEVELAND 3, OHIO
TELEPHONE: CLEVELAND EXPRESS 1-3571

MAJOR GENERAL FRANCIS H. LANAHAN

Federal Electric Promotes Lanahan

International Telephone & Telegraph Corp has announced the election of Major General Francis H. Lanahan, U. S. A. (Ret) as executive vice president of Federal Electric Corp. Federal Electric is the field service and maintenance subsidiary of IT&T.

General Lanahan, a 1920 graduate of West Point, became associated with Federal Electric after his retirement from the U. S. Army Signal Corps in 1955. Since that time he has served as vice president and general manager of the company.

PERSONAL BRIEFS

W. Herbert Lambert has been promoted by Pennsylvania Electric Co's technical department from operating superintendent to superintendent of production for the company. His newly named assistant is **Charles W. Statler,** former superintendent of the Shawville generating station. **Chelton W. Smith** replaces Statler and **Richard F. McClement** assumes Smith's former post of Warren station superintendent. Technical department has also advanced **Ralph F. Bovier** from system electrical engineer to superintendent of transmission to succeed the late **Martin J. Fulton,** and has named **Paul L. Lumnitzer** assistant superintendent of transmission. In other company changes **Leroy L. Bradford** becomes Central Division operating superintendent and **George W. Haines** is new DuBois district manager. Haines succeeds **Jacob P. Mottorn** who transfers to the Johnstown engineering department. **David M. Hunter** is new superintendent of Oil City station.

Cleveland Electric Illuminating Co is combining its public relations and advertising operations into a new department to be called public relations and advertising. Effective Sept. 1, this combined operation will be headed by **Robert H. Bridges,** currently advertising manager. In conjunction with the reorganization and to better serve the eastern district section, **Clifton B. Williams** will leave the Cleveland office to head a public relations branch office at Painesville.

William H. Steinhauer has been promoted to power sales manager of Toledo Edison Co succeeding **C. H. L. Thompson,** deceased. Steinhauer has been power sales engineer since 1946.

Central Illinois Public Service Co announces the promotion of **Edwin M. LaBaw** to manager of the rates and research department. LaBaw, rate engineer since 1949, succeeds **Harry E. Montgomery** who retired recently.

Dr. Robert R. Johnson has been appointed manager of digital computer engineering for General Electric Co's industrial computer component . . . **William M. Nave,** former plant manager of GE's Anniston Tube Plant, has been named consultant of manufacturing organization and shop operations, manufacturing services. GE also named **Frank Ondrovik** manager of advertising and sales promotion for the southwestern apparatus sales district. Ondrovik succeeds **Joseph J. Synar** who has been named southwestern regional manager for the Live Better Electrically project.

Westinghouse Electric Corp has named **James R. Eagles** assistant to the division manager of Bryant Electric Co., subsidiary. . . . **Thomas R. Lawson** has been appointed to the staff of the vice president in charge of Westinghouse's Motor and Control Division.

Anaconda Co announces the appointment of **Douglas Munroe** as assistant to the executive vice president. He will also have charge of the company's personnel department.

G. Raymond Cuthbertson has been elected a vice president and named general manager of the Tire Division of United States Rubber Co. He succeeds **Howard N. Hawkes,** vice president, who has been elected a member of the board of directors and member of the executive committee.

Flint Steel Corp has announced the election of corporate officers and other promotions—**C. W. Flint, Jr.,** chairman of the board and vice president; **Harold G. Lewis,** president; **C. B. Gannaway, Jr.,** executive vice president and general manager; **Stanley L. Spence,** vice president and manager of plate sales; **H. N. Williams,** vice president and manager of structural and warehouse sales; **M. W. Clark,** vice president and director of purchasing; **P. J. Koons,** assistant vice president and works manager, Tulsa plant; **Jack W. Hulse,** assistant vice president and works manager, Memphis plant; and **Glenn H. Knight,** secretary and treasurer. **David E. Fields** resigned as vice president and plate sales manager.

George R. Winkley is new treasurer and assistant to the president of Speedway Manufacturing Co, a division of Thor Power Tool Co. **William E. Sopusek,** former office manager, becomes secretary.

Recent appointments by Fluor Corp, Ltd., made **Otto H. Hedrich** principal power engineer-mechanical and **Charles B. Bennet** principal power engineer-electrical.

Harold J. LeBeck has been named assistant to the manager of the Industrial Plastics and Bearings Division—formerly known as the Ryertex-Glyco Division—of Joseph T. Ryerson & Son, Inc.

Abraham Fischer has been appointed sales and merchandising manager, technical products service department, RCA Service Co. Fischer was previously sales manager of mobile equipment consumer products service department.

When do you know they're good enough?

In EHV Applications, Shielding Devices Should Perform as Good or Better Than Supported Conductor Arrangement

Our basic interest in conducting the research shown here is to develop the best insulators and hardware (we make them both) for use with bundled conductors in extra high voltage transmission. The set-up shown is experimental. It's not in use on today's 330-kv lines. But it may well be used on tomorrow's 550 (?) lines.

We design our shielding devices to have radio and corona characteristics that are equal to or better than the best supported conductor arrangement. Smooth tubes were used in this experiment because we know they'll provide optimum corona performance for a given conductor diameter. If our shields and other hardware work as good or better than smooth tubes, we know they'll be corona free when used with equal diameter stranded conductor.

Out of such experiments come other benefits to the power industry. The same technical know-how and facilities that produce answers on hardware and insulator performance have also brought development of a formula for predicting radio and corona characteristics of smooth conductors.*

Other experiments in the laboratory are also designed to anticipate and solve tomorrow's problems in extra high voltage transmission. Meanwhile, more than two-thirds of the EHV miles in North America have been built with O-B insulators and hardware . . . showing that lessons learned in the laboratory can be translated into products that will handle the most exacting transmission jobs.

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*"Mathematical Prediction of Radio and Corona Characteristics of Smooth Bundled Conductors"—By C. J. Miller, Jr., Ohio Brass Company, presented at AIEE Great Lakes District Meeting, Fort Wayne, Indiana, April 16-18. We'll be glad to send you a copy. Ask for O-B No. 1362-H.

How high will extra high voltage go? Our research has shown that insulation, conductor hardware and related shielding devices need place no upper limit on transmission voltage magnitude.

Ohio Brass

MANSFIELD OHIO, U.S.A.

IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT. 4677-H

MEETINGS CALENDAR

AUGUST

WESTERN ELECTRIC SHOW AND CONVENTION—Pan Pacific Auditorium and Ambassador Hotel, Los Angeles, Calif., Aug. 21-24.

SEPTEMBER

NORTHWEST PUBLIC POWER ASSOCIATION, INC—Meter School, Oregon State College, Corvallis, Oregon, September 10-14; Accounting Section, Cascadian Hotel, Wenatchee, Washington, September 11-14.

EDISON ELECTRIC INSTITUTE—Organization Meeting, sponsored jointly with AGA, Edgewater Beach Hotel, Chicago, Ill., Sept. 13-14; Industrial Relations Round Table Conference, Drake Hotel, Chicago, Ill., Sept. 17-19; Meter & Service Committee, Purdue University, Lafayette, Ind., Sept. 24-26.

• **MARYLAND UTILITIES ASSOCIATION**—32nd Fall Conference, Cavalier Hotel, Virginia Beach, Va., Sept. 14-15.

PUBLIC UTILITIES ASSOCIATION OF THE VIRGINIAS—38th Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., Sept. 14-15.

AMERICAN SOCIETY FOR TESTING MATERIALS—Second Pacific Area National Meeting, Statler Hotel, Los Angeles, Calif., Sept. 16-22.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—3rd Annual Electrical Conference of the Petroleum Industry, Kansas City, Mo., Sept. 17-19; Fifth Annual Industrial Electronics Symposium, sponsored jointly with the Institute of Radio Engineers, Hotel Manger, Cleveland, Ohio, Sept. 24-25.

ILLUMINATING ENGINEERING SOCIETY—National Technical Conference, Hotel Statler, Boston, Mass., Sept. 17-21.

INSTRUMENT SOCIETY OF AMERICA—11th Annual Instrument-Automation Conference and Exhibit, New York Coliseum, Sept. 17-21.

MISSOURI VALLEY ELECTRIC ASSOCIATION—Accounting Conference, Lassen Hotel, Wichita, Kansas, Sept. 20-21.

• **SOUTHEASTERN ELECTRIC EXCHANGE**—Engineering & Operations Section, John Marshall Hotel, Richmond, Va., Sept. 20-21.

ATOMIC INDUSTRIAL FORUM, INC—3rd Annual Forum Conference and 2nd Annual Trade Fair, Morrison Hotel and Navy Pier, Chicago, Ill., Sept. 24-28.

PENNSYLVANIA ELECTRIC ASSOCIATION—49th Annual Meeting, Hotel Wm. Penn, Pittsburgh, Pa., Sept. 25-26.

ELECTRIC COMPANIES PUBLIC INFORMATION PROGRAM—Steering Committee, Blackstone Hotel, Chicago, Ill., September 26; Workshop Conference, Blackstone Hotel, Chicago, Illinois, September 26-28.

OCTOBER

EDISON ELECTRIC INSTITUTE—Prime Movers Committee, Radisson Hotel, Minneapolis, Minn., Oct. 1-3; Area Development Committee Meeting, Oct. 3, and Area Development Committee Workshop, Radisson Hotel, Minneapolis, Minn., Oct. 4-5; Electrical Equipment Committee, Hotel Statler, Cleveland, Ohio, Oct. 15-16; Transmission and Distribution Committee, Hotel Statler, Buffalo, N. Y., Oct. 18-19.

ILLINOIS INSTITUTE OF TECHNOLOGY—12th Annual National Electronics Conference, sponsored jointly by AIEE, Institute of Radio Engineers, University of Illinois, and Northwestern University, Hotel Sherman, Chicago, Ill., Oct. 1-3.

NATIONAL ELECTRONICS CONFERENCE—12th Annual Conference and Exhibition, Hotel Sherman, Chicago, Ill., Oct. 1-3.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Fall General Meeting, Morrison Hotel, Chicago, Ill., Oct. 1-5.

CANADIAN ELECTRICAL MANUFACTURERS' ASSOCIATION—12th Annual Meeting, Sheraton Brock Hotel, Niagara Falls, Ontario, Canada, Oct. 3-5.

INDIANA ELECTRICAL ASSOCIATION—Annual Convention, French Lick Springs Hotel, French Lick, Ind., Oct. 3-5.

MISSOURI VALLEY ELECTRIC ASSOCIATION—Sales and Rural Conference, Hotel President, Kansas City, Mo., Oct. 3-5.

STANDARDS ENGINEERS SOCIETY—Fifth Annual Meeting, Hotel Willard, Washington, D. C., Oct. 3-5.

SOUTHEASTERN ELECTRICAL EXCHANGE—Sales Conference, Tides Hotel & Bath Club, St. Petersburg, Fla., Oct. 3-5; Accounting Meeting, Hotel Seville, Miami, Fla., Oct. 10-11.

INTERNATIONAL ASSOCIATION OF ELECTRIC LEAGUES—Sheraton-Cadillac Hotel, Detroit, Mich., Oct. 3-6.

• **PENNSYLVANIA ELECTRIC ASSOCIATION**—Electric Equipment Committee, Arlington Hotel, Binghamton, N. Y., Oct. 4-5; Relay Committee Meeting, Hotel Robert Treat, Newark, N. J., Oct. 25-26.

ROCKY MOUNTAIN ELECTRICAL LEAGUE—Annual Fall Convention, Broadmoor Hotel, Colorado Springs, Colo., Oct. 7-10.,

INTERSTATE POWER CLUB—Hotel Martinique, New York, Oct. 8.

ILLINOIS INSTITUTE OF TECHNOLOGY—Conference on Computer Applications, Chicago, Ill., Oct. 9-10.

INTER-INDUSTRY FARM ELECTRIC UTILIZATION COUNCIL—National Power Use Workshop, Milwaukee Auditorium, Milwaukee, Wis., Oct. 15-16.

• **IOWA UTILITIES ASSOCIATION**—Annual Management Conference, Hotel Fort, Des Moines, Iowa, Oct. 15-16.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Electrification of Machine Tools Conference, Sheraton-Gibson Hotel, Cincinnati, Ohio, Oct. 22-24.

UNIVERSITY OF TEXAS—Ninth Power Distribution Conference, University Batts Auditorium, Austin, Tex., Oct. 22-24.

AMERICAN STANDARDS ASSOCIATION—38th Annual Meeting and 7th National Conference on Standards, Hotel Roosevelt, New York, Oct. 22-24.

NATIONAL SAFETY COUNCIL—44th National Safety Congress & Exposition, Chicago, Illinois, Oct. 22-26.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS—South Central Region Meeting, M & M Building, Houston, Texas, October 23-26.

NORTHWEST PUBLIC POWER ASSOCIATION—Power Use Section, Franklin PUD Auditorium, Pasco, Wash., Oct. 25-26.

MONTANA STATE RURAL ELECTRIC COOPERATIVE ASSOCIATION—Annual Meeting, Lewiston, Mont., Oct. 29-31.

NOVEMBER

• **LOUISIANA POLYTECHNIC INSTITUTE**—Fifth Annual Instrumentation Conference, Ruston, La., Nov. 1-2.

NATIONAL RURAL ELECTRIFICATION COOPERATIVE—Region Nine Annual Meeting, Davenport Hotel, Spokane, Wash., Nov. 12-13.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION—Annual Meeting, Traymore Hotel, Atlantic City, New Jersey, Nov. 12-16.

EDISON ELECTRIC INSTITUTE—Industrial Relations Committee, EEI Headquarters, New York, N. Y., Nov. 15; Accident Prevention Committee, Statler Hotel, Hartford, Connecticut, November 26-28.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—22nd National Exposition of Power and Mechanical Engineering, Coliseum, New York, N. Y., Nov. 25-30.

GREAT LAKES CONFERENCE OF RAILROAD AND UTILITIES COMMISSIONERS—First Annual Convention, Greenbrier Hotel, White Sulphur Springs, W. Va., Nov. 29-30.

DECEMBER

INSTITUTE OF RADIO ENGINEERS—2nd Instrumentation Conference, Biltmore Hotel, Atlanta, Ga., Dec. 5-7.

EDISON ELECTRIC INSTITUTE-AMERICAN GAS ASSOCIATION—1957 Conference Planning Committee, EEI-AGA Headquarters, New York, N. Y., Dec. 6-7.

• Additions this week.

Now a new standard of safety in low-voltage switchgear

Test position with doors closed

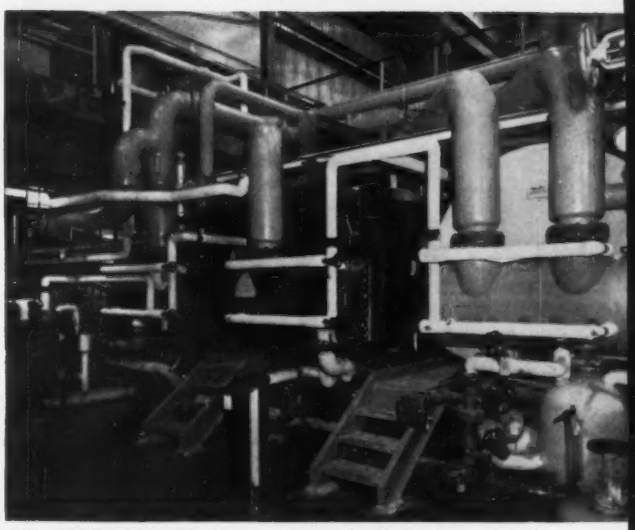
This exclusive I-T-E low voltage switchgear feature establishes a new standard of safety in testing circuit breakers. It offers the additional advantages of reduced handling; less maintenance; convenient "tagging out"; better dust protection; easier circuit identification. And all are yours at no increase in cost in the compact, modern design of I-T-E low-voltage switchgear.

For complete information, contact your nearest I-T-E sales office. Or write for Bulletin 6004B. I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa.

I-T-E CIRCUIT BREAKER COMPANY
Switchgear Division

Morro Bay First With Sea Water Evaporators in US

Estimated cost is $1.96 per 1,000 gallons for boiler make-up water with 1 ppm solids and general utility purpose water with 50 ppm solids. Evaporator capacity is 50 gpm



FULL INSULATION OF the evaporator bank and associated piping helped to keep water conversion costs to a minimum

The first industrial application of sea water evaporators in a stationary steam plant in this country has been made at Pacific Gas & Electric Company's Morro Bay, Calif., installation. Here sea water evaporators were selected as the most feasible means of supplying boiler make-up water, since local fresh water supply could not meet requirements.

Because the cost of large scale sea water conversion is high, the evaporators were designed to operate at maximum efficiency to keep boiler steam necessary for the conversion to a minimum. Assuming a fuel oil cost of $1.75 per barrel, 100% load on the evaporators, and steam extraction from the turbine, the cost per 1,000 gallons is estimated at $1.96. This compares with a municipal water rate in San Francisco of $0.247 per 1,000 gallons. Municipal water, however, would require additional treatment before being used in a boiler.

Treat 100 Gpm of Sea Water

Water demands for this 330-Mw station (two 165-Mw units) require an initial conversion of 100 gpm of sea water into water having a solids content of less than 50 ppm for general utility purposes. Approximately half of this must be further purified for boiler make-up water containing less than one part per million solids. One three-effect sea water evaporator and high purity station evaporator are provided for each of the two main units.

Two principal methods of operation are used. In Method I, known as Three-Effect Evaporation, sea water used to cool the turbine steam condensers is pumped to the evaporators at a rate of 150 gpm. From this, 50 gpm is evaporated to a purity of 50 ppm in the three-stage process under a partial vacuum. The remaining brine is pumped to the circulating water discharge tunnels. For boiler make-up requirements, part of the 50 ppm water is pumped to the high purity station evaporator where solids are cut to 1 part per million. The remainder is pumped to the 500,000-gallon standpipe for general utility use.

Steam required for the first stage of the evaporation process is the vapor from the high purity station evaporator. It enters the first stage evaporator at 230F. The vapor from the first-effect evaporator is the supply for the second-effect evaporator and this, in turn, is the supply for the third-effect evaporator.

Method II, known as Two-Effect Evaporation, is employed when it is desired to use all the condensate from the sea water evaporators to produce 1 ppm boiler make-up in the high purity station evaporator. The first-effect sea water evaporator is used as a station (high purity) evaporator and only the second and third sea water evaporators are used for generating steam from the sea water. As in Method I, the vapor from the station evaporator will provide heat for the first-effect sea water evaporator. However, the make-up water supplied to the shell will be the 50 ppm condensed vapor from the second and third-effect sea water evaporators instead of raw sea water. The combination of the vapor from the first-effect evaporator and the station evaporator will provide water of about 1 ppm.

Insulation Keeps Cost Low

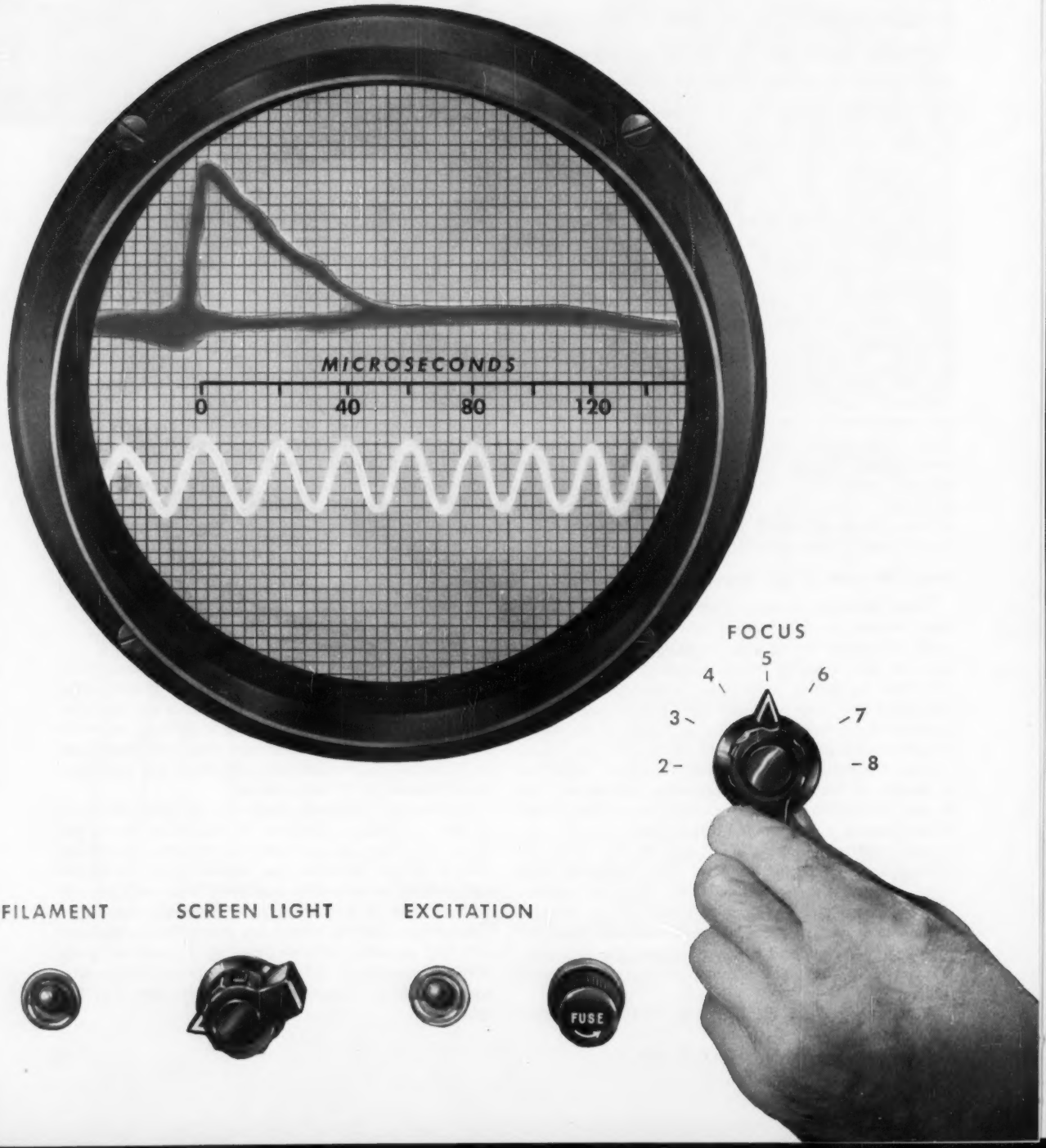
While sea water evaporators have operated satisfactorily without thermal insulation, the objective of keeping water conversion costs as low as possible led to the insulation of the sea water evaporation shells and piping at Morro Bay. Using the most economical insulation thicknesses on the entire system, maximum efficiencies and economies were effected for all heat sources.

Sectional 85% magnesia insulation was applied to piping on the sea water evaporators in thicknesses determined by the pipe size and operating temperatures. The vessel surfaces of the first-effect and second effect evaporators and the high purity station evaporator were insulated with a single layer of 2-in. thick 85% magnesia blocks.

Other equipment at Morro Bay Power Station insulated with 85% magnesia included power plant piping and boiler auxiliary equipment. Where high operating temperatures are encountered, diaomaceous silica insulation was first applied.

DISTRIBUTION TRANSFORMERS

THIS IMPULSE TEST



COULD SAVE YOU...$45

Estimate your possible savings in terms of all transformers on your lines

When General Electric started production-line impulse testing its distribution transformers in 1946 more than 15% of the units were rejected. These units had previously passed **all other tests.** Had these transformers been shipped, they might have given years of satisfactory service under normal conditions, or they might have failed under sudden stress.

By weeding out failures in advance it is conservatively estimated that the average life of distribution transformers is increased 15%. Based on the cost of a 25-kva, 2400-volt unit this means a $45 saving on each transformer.

Impulse testing makes the difference. Every unit 100 kva and below has both high- and low-voltage windings tested on the G-E production line without lightning protection of any kind. Any hidden weakness is detected automatically and the faulty transformer is rejected. This means that every G-E distribution transformer you add to your system has already been proven under greater stresses than encountered in normal service.

Look at the other money-saving features that prove "All transformers are not alike": **One-piece clamping bands,** for instance, save maintenance time. Reusable **Nitrile rubber gaskets** help save units from contamination. **AL/CU terminals** are designed to prevent both copper and aluminum conductors from loosening. **Strenicor terminal clamps** save terminals from breaking. **Super Melaglyp paint** saves up to two repaintings. **Nationwide warehouses** save utilities heavy inventory expense. **Service shops** can cut your repair and rebuilding costs.

For the complete story contact your nearest G-E Apparatus Sales Office or G-E Agent—or write to General Electric Company, Schenectady 5, New York.

431-36

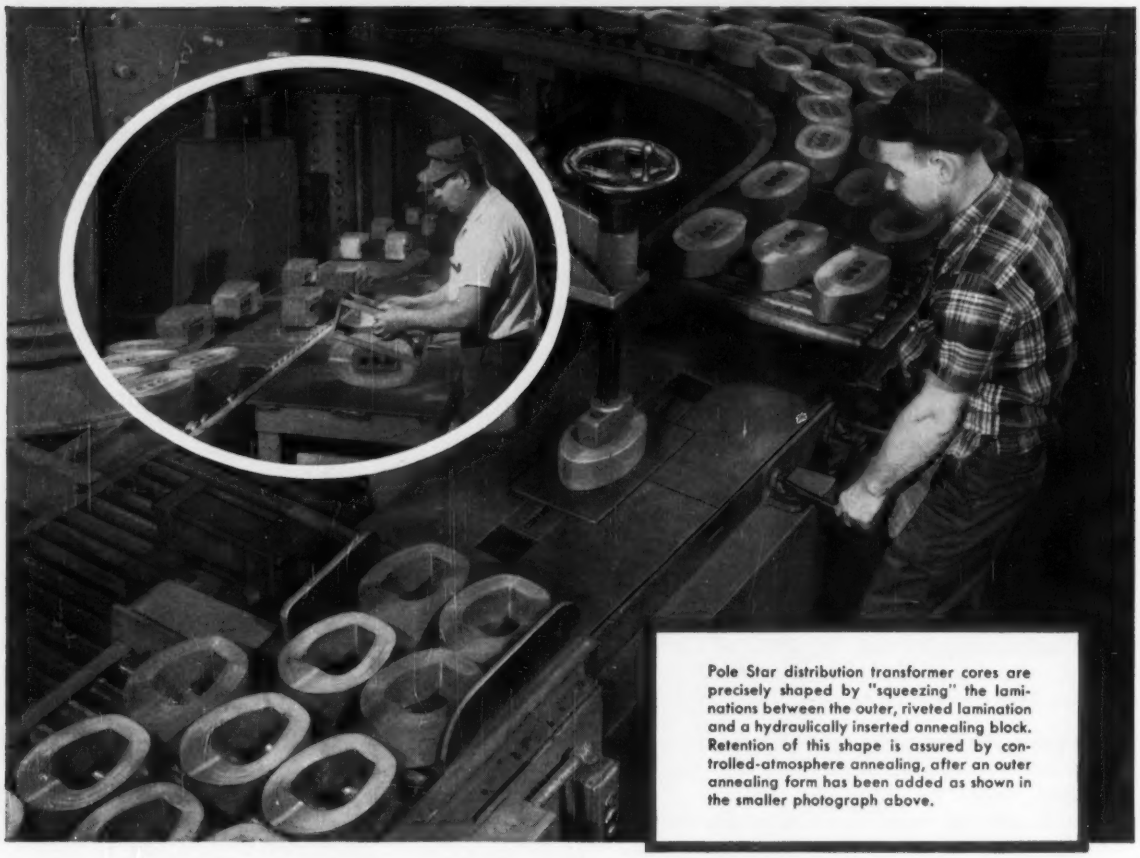
dollar-saving features prove ATANA*

***ALL TRANSFORMERS ARE NOT ALIKE**
(make this simple comparison and see)

FEATURE	General Electric	Mfr. A	Mfr. B	Mfr. C	Mfr. D	Mfr. E
Production-line impulse testing	√			√		√
Nitrile rubber gaskets	√					√
One-piece clamping band	√					
H-v and l-v terminals handle both copper and aluminum conductors	√					
Strenicor pressure terminal clamps	√					
Super Melaglyp paint	√					
More than 100 warehouses	√	√				
Nationwide, company-operated service shops	√	√				

Progress Is Our Most Important Product

GENERAL ELECTRIC



Pole Star distribution transformer cores are precisely shaped by "squeezing" the laminations between the outer, riveted lamination and a hydraulically inserted annealing block. Retention of this shape is assured by controlled-atmosphere annealing, after an outer annealing form has been added as shown in the smaller photograph above.

Precision-shaping POLE STAR cores keeps exciting current and core loss uniformly low

After a Pole Star core is given its preliminary shape by forming dies, the outer lamination is riveted into position and an annealing block is inserted into the window of the core by means of the hydraulic press pictured above. By thus "squeezing" the laminations between the annealing block and the outer lamination, the core is precisely shaped in accordance with predetermined specifications for the particular size. The laminations, which had been cut to progressive lengths for telescoping of the individual pieces, are uniformly lapped.

Both the finished core shape and the uniform laps are figuratively "locked" in place by the stress annealing operation that follows. Annealing in controlled-atmosphere furnaces also insures retention of the inherent qualities of the grain-oriented steel. Any adhesions that may be formed during annealing are eliminated later, because laminations are separated from each other as they are placed in the coil and individually re-lapped.

Such rigidly controlled production means that the advantages of Pole Star's patented lap-on-top core are as consistent as they are outstanding. The individually lapped laminations create a large cross-section area at the lap that reduces the density and prevents a concentration of flux. The absence of gaps or butt joints assures a low exciting current. High interlamination resistance, plus the absence of adhesions, keeps core loss at a low value.

167 Production Controls make Pole Star Best!

PENNSYLVANIA TRANSFORMER COMPANY

A McGraw Electric Company Division **CANONSBURG, PA.** *Greater Pittsburgh District*

Pole Star Transformers are available in all standard single phase distribution sizes from 3 through 500 kva, through 67,000 volts.

You'll Have to Police House Heating

One bad electric heating job chases away dozens of prospects. Here's how Kansas G&E hopes to avoid the kind of jobs that sour the market

Ask the sales manager of any electric utility now promoting house heating. He will tell you that the quickest way to kill off the market is to allow a few inadequate or high cost jobs to get on the line. A dissatisfied customer is about the biggest liability that a house heating campaign can have.

Kansas Gas & Electric Co, which now has a big house heating campaign rolling, has evolved a three-step plan to avoid the kind of jobs that sour the market. It's too early to gage its effectiveness, but it appears to be about as foolproof as can be worked out. Here's the main features:

(1) The utility has drawn a simple list of recommendations for electric space heating covering equipment capacity, controls, and required home insulation.

(2) It has offered to work with electric heating dealers to help promote the market and to assure customer satisfaction.

(3) It will advise customers considering use of electric heating as to the capacity, controls, and home insulation needed for a satisfactory installation.

In this way the Kansas G&E hopes to build its house heating market on solid foundations. If dealers or customers fail to heed the recommendations of the company, it will impress on them that the responsibility is theirs. But the utility is exerting every effort to make sure that its policy is widely known and understood. It has written to all dealers and manufacturers who have a stake in the market in its service area. It has advertised its policy in the newspapers of its area. It intends to follow up its recommendations with the manpower required.

Heart of the Kansas G&E plan is the one page list of concisely-written recommendations. Main points:

Installed capacity should be adequate to maintain 70° F indoor temperatures with an outdoor temperature of −10° F. This capacity shouldn't be exceeded by more than 10% and should be distributed according to the heat loss of each room or area.

Close tolerance thermostats should be used in each heated area or room. One thermostat should not control over 15 amperes of radiant heating.

Area should be insulated to reduce the heat loss to less than 4.2 BTU per hour at 80°F temperature differential per cubic foot of heated space. Specific thicknesses and methods of installation are spelled out. Windows and doors should be weather stripped and storm windows and doors or double glass used. Vapor barriers are recommended. Low velocity exhaust fans are recommended for kitchen and bathroom to help control humidity.

TECHNICAL NOTES

Cooling main transformers with condensate to recover transformer losses in the power station heat cycle is not always economical.

Boring insects are destroyed when wood is raised to 60C for a few seconds by application of high-frequency current.

Low-steam-velocity design permits steam condenser to be placed in less than normal headroom under the turbine.

Lighting for color TV studios generates so much heat that air conditioning must have twice the capacity usually required to lower 95F outside air to comfortable working level.

Low-head hydro stations cost less when generator rotors are mounted on the runner shaft. Compact unit height permits lower station cranes for savings in building cost.

Superior heat rate of cross-compound machines must be weighed against added overhaul time for two units, cost and probability of tripouts for additional auxiliaries, and the greater complexity of getting a tripped unit back on the line.

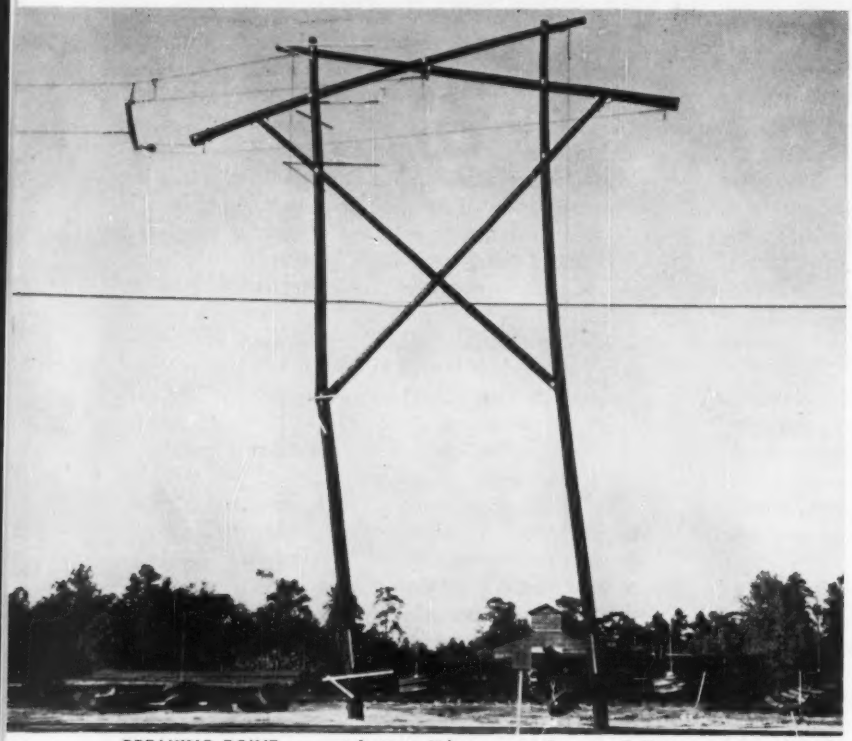
Lead well-mixed in steel-forging ingots lubricates cutting tools to speed machining, conserve machining power, and improve surface finish without basic change in characteristics of the steel.

Mobile hoisting equipment on rail mounts can handle erection of large turbine generators where conventional cranes are not available.

New Spar-Type H-Frame Structures

TRANSMISSION Design

Indiana utility builds 230-kv H-frames so large end of spar takes maximum strain and stress is low on the pole



BREAKING POINT was at bottom X-brace attachment. Failure was at 1,600 lb. Poles are 65 ft Class 3; spars 35 ft Class 6. Fig 1 gives the design details

YOKE ARRANGEMENT hold X-brace spar members together at the center. This is an important detail in the design for transferring stresses from spar to pole

Modifications in spar-timber, H-frame structure design afford Public Service Co of Indiana a stronger, lower-cost transmission construction. The new design was developed by engineers of the utility and of the Gulfport Creosoting Co, working jointly.

The new design calls for four spar members, two to form the X-brace and extend beyond the poles at the top attachment point to support the others. The latter carry the conductors 4 ft out from the poles of structures having a 20-ft pole spacing. This arrangement reduces the bending moment exerted by the conductor on its supporting spar.

Spar members have butts down. This arrangement places the large part of the member at the point of maximum strain, so that greatest use is made of the wood in the spar. Thus a smaller spar can do the job.

In the new design, structure stresses are transferred directly through X-brace members to the pole at the bottom attachments of the X-brace. On structures whose poles are 15 ft or farther apart the bottom attachment point is lower than on the standard X-brace. Thus the pole section at this point is larger and stronger. As the point of attachment is also the critical point, the whole structure becomes stronger as the point of attachment is lowered. Greater strength allows the use of longer spans, thus reducing the required structures.

Direct transfer of structure stresses through single spar members to the bottom point of attachment of the X-brace eliminates the top point of the X-brace attachment as a possible breaking point. As the pole section at the top point is smaller, engineering calculations for one possible breaking point are eliminated.

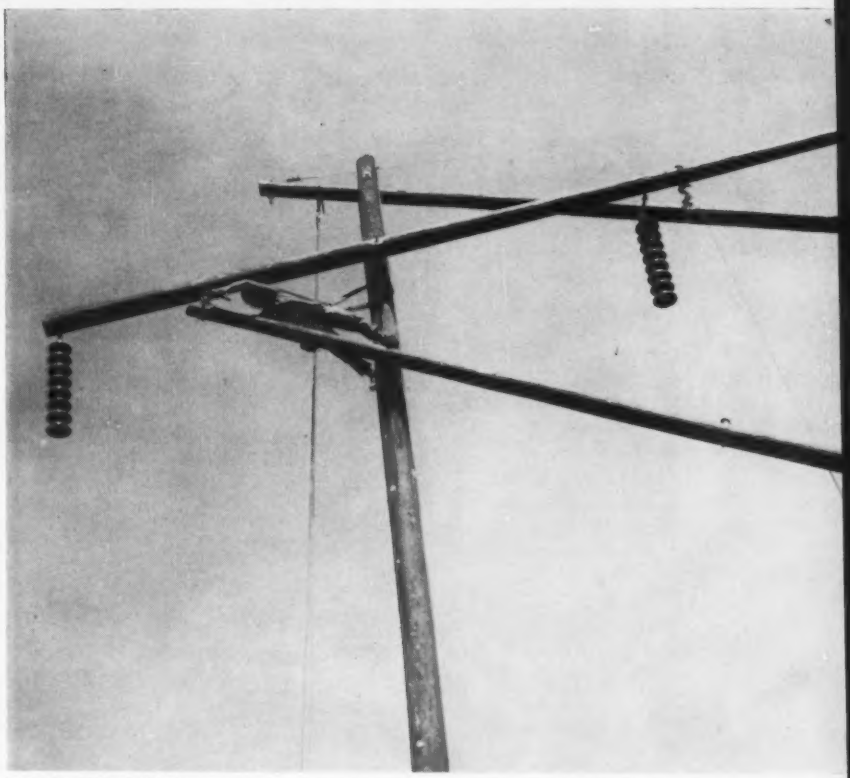
Besides being stronger, the new structures are approximately 25% cheaper than the structures formerly used by the company for 230 kv. These cost reductions lie in the simplified design and in the small number of structure members. Structures have also been designed for single-circuit, 230-kv; single-circuit, 138-kv; double-

Are Stronger, Cost 25% Less

circuit, 1-138-kv and 1-66-kv, and double-circuit, 66-kv lines.

Five 230-kv structures have been installed on a 138-kv line where special terrain conditions prompted the use of 1,300-ft spans. These will be used to obtain construction and operating experience. Plans call for the construction of 3 or 4 miles of double-circuit, 66-kv line of this new design this year, spans averaging 600 ft. Maximum permissible span length is 850 ft for this particular design. Conductors will be 336,400 circ mil ACSR, and there will be two ⅜-in. steel strand shield wires.

Metal gains, designed especially for spar construction (EW, April 6, 1953, p. 76), are used for attachments between spars and between spars and poles. A gain has one flat side and one curved to grip the round member. There is also an end fitting for the spar members which has a curved surface for gripping the pole. As the spars are given the same treatment as line poles, it is expected that they will have the same life as the poles. The company's experience with spar construction supports up to the present this view.



LARGE SPAR SECTION, supporting conductor, takes maximum strain where member's strength is greatest. Small end takes minimum strain; supports shield wire

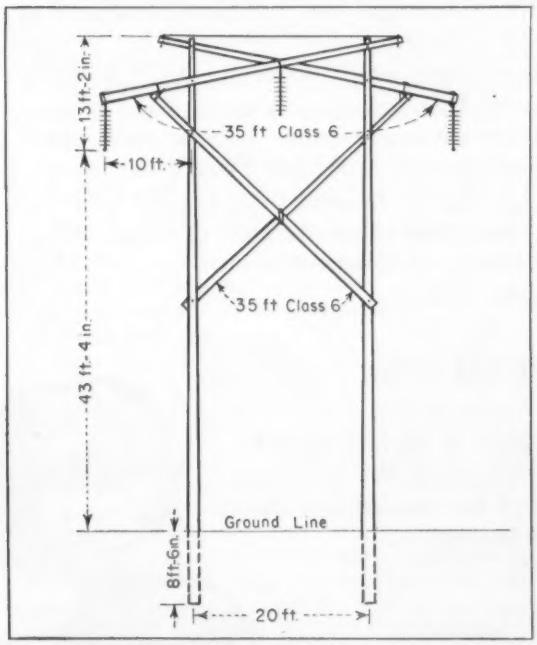
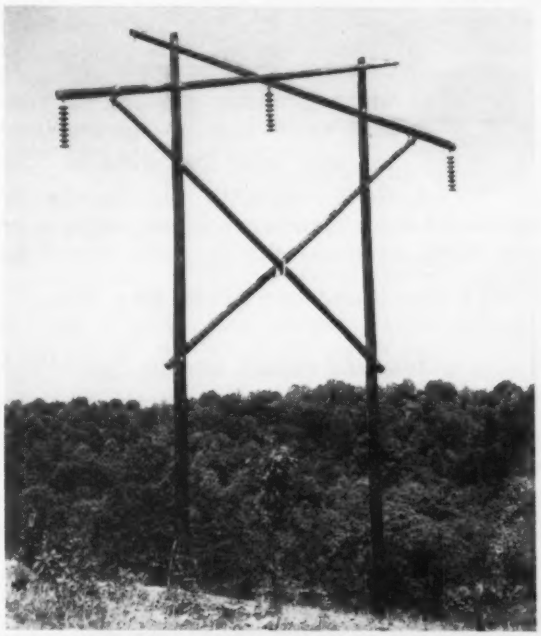


FIG 1—DESIGN is for 230 or 138-kv long span construction. The 138 kv uses 8 insulators per string; 230 kv uses 12



FIVE STRUCTURES have been built for a 138 kv line where 1,300 ft spans were required. Poles are on 20 ft spacing

ABOUT THE FINER POINTS OF METERING...

For better protection against lightning surges

The most common cause of a watthour meter speeding up in service is that the damping magnets have lost some of their strength. Lightning surges and short circuits can de-magnetize even the best chrome steel magnets.

That's why Sangamo J2 Meters are equipped with small, powerful, highly surge-resistant *Alnico* damping magnets. These magnets are extremely stable because they are magnetically and heat aged. These better magnets provide the damping for the higher torque and lower speed of the Sangamo J2—your best investment in a watthour meter.

The J2 meter is the SLOW SPEED meter

At full nameplate rating, the J2's disk makes only 10 revolutions per minute. *This is many times slower than the disk speed of any other watthour meter on the market today.* And slow speed is *one* of the reasons why the J2 lasts longer . . . gives you more years of trouble-free service.

JM56-5

SANGAMO

ELECTRIC COMPANY Springfield, Illinois

Contests like this are for birds, said dealers until . . .

PGE Deal Booms Store Traffic

Portland General Electric Co wound up its eight-week "Wifesaver" electric range contest June 1 convinced its sales promotion effort had found some of the answers to getting dealer cooperation and holding appliance salesmens' support.

All together, reports Fred Kempe, PGE advertising manager, and William Taite, appliance sales manager, the effort produced twice as many contest entries as any previous range contest of PGE postwar sponsorship.

Each contestant had to complete a sentence beginning:

"Eight out of 10 of my neighbors use and prefer an electric range because . . ."

But to get her application in the contest validated the housewife was required to state "I want to win a ———— range," naming a specific brand. She was then required to drop the application in a box at a store selling the brand of range, but not until the entry had been validated.

Requirement No 3 said:

"Every entry must be validated by an appliance dealer who carries the make of range you prefer. The dealer will send your entry in for you."

Special window banners labeled each appliance store cooperating and the banner themes were emphasized in PGE's promotions.

Three ranges were awarded each week and the grand prize was a $3,000 model all-electric kitchen. Each salesman who had assisted the winners in validating their entries won a new suit—24 suits in all were awarded.

Trade In Offer, Too

As a further inducement for prospective range customers who did not win, PGE tied in its "Operation Trade In" which offered $35 for the obsolete ranges via the dealers. This trade-in had a step-up system. An allowance of $15 was given for all types—electric or fuel fired. If the customer was eligible for PGE's all electric rate by reason of the purchase an additional $10 was allowed. If the traded stove was delivered to PGE, still another $10 was given for the total $35.

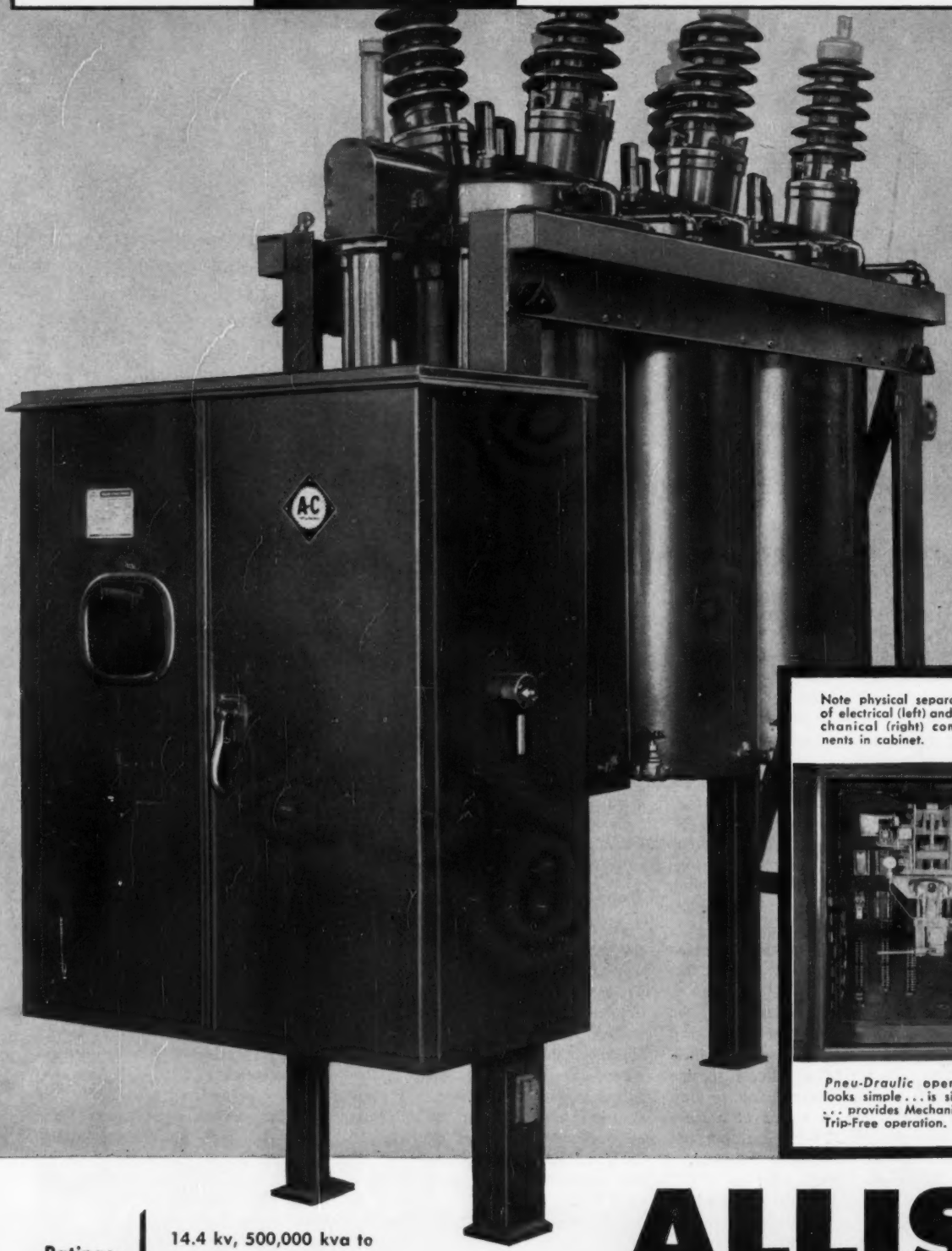
Taite reported the Portland utility staff had found the conventional contest didn't appeal to the dealers. Said Taite: "One dealer actually said 'contests are for the birds'. We decided our plans had to be valuable to the dealers or we were just talking to ourselves. The problem was to make the applicant more interested and also more vulnerable to salesmen on dealers' display and sales floors.

"For one thing the prizes were displayed on dealers' floors, not in PGE windows. When the applicant walked into the store to have her entry validated, a salesman was able to say 'This is the range you want to win' and the effect was dramatic.

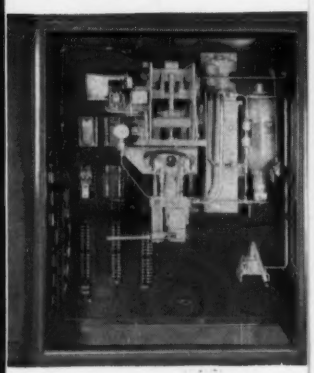
"We felt we had eliminated some of the problems. Our confidence was justified by the 7,000 selected entries the judges worked over in the Portland service area."

And capping it all, said Taite, "We even had dealers come down to the office and pick up entry blanks—1,500 to 2,000—for mailing to his own listings at his own expense. We never got that type of cooperation before from the dealers."

You get MORE when it's Built by



Note physical separation of electrical (left) and mechanical (right) components in cabinet.



Pneu-Draulic operator looks simple . . . is simple . . . provides Mechanically Trip-Free operation.

Ratings: 14.4 kv, 500,000 kva to 69 kv, 3,500,000 kva

ALLIS-

ALLIS-CHALMERS

NEW

frame-type Allis-Chalmers

BREAKER

Completely Redesigned from Top to Bottom for MORE Accessibility

Here are some of the many features of this new breaker:

- Low maintenance, due to:
  a) Simplified external adjustment of overtravel stop . . . no feeler gauges required.
  b) Single lift rod guide (in place of two) for greater accessibility to pole unit mechanism.
  c) Only four bolts hold tank to frame . . . simplifies lowering.
  d) Cabinet built shallow for easy access.
- No tank liner required.
- High efficiency oil-gas separator.
- AEIC standard wiring *plus* ASA standardized bushings.
- 100% Mechanically Trip-Free — like all Allis-Chalmers breakers.
- Available with *Pneu-Draulic*, pneumatic or solenoid operator.

For the rest of the story, call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

A-5011

Ball-type position indicator on top of breaker visible from 360 degrees.

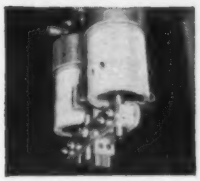
Side trip provides accessibility — *plus* provision for padlocking.

Sampling oil is drawn from the working area of breaker tank.

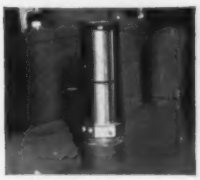
Smooth fabricated steel top for each tank — free from crevices or ridges.

Operator cabinet is low to foundation level for easy access to interior.

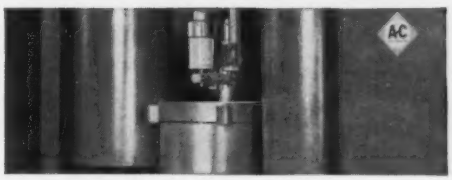
CT lead ducts eliminate conduit—have removable bottom plates for full-length access.



Turbo Ruptor device has threaded pot for easy removal . . . self-aligning tulip and bayonet contacts.



Float-type oil gauge provides more visibility . . . eliminates leakage of sight type gauge.



Access to tanks and contacts is unobstructed by frame. Note full tank skirt for stability when lowered.

Pneu-Draulic and *Turbo Ruptor* are Allis-Chalmers trademarks.

CHALMERS

A-C ALLIS-CHALMERS

WHAT THE WELL DRESSED LINEMAN WILL WEAR...

from one convenient source...

Graybar

Belts to bits . . . climbers to come alongs . . . linemen work more efficiently and in greater safety with equipment they know and respect.

For special or emergency orders, or for regularly-scheduled replacements, your nearby Graybar office or warehouse can furnish tools, supplies and equipment best suited to the job. You make your selection from the finest, most complete lines of products available – made by the nation's leading manufacturers. Graybar ships your order promptly. You save purchasing time and paper work.

Call Graybar for all of your other pole-line needs as well. You can rely on your local Graybar office or warehouse to provide complete, accurate information on everything electrical for pole-line construction and maintenance. For special help on tough or unusual problems, feel free to ask for the assistance of a Graybar Outside Construction Specialist.

634-98

GRAYBAR ELECTRIC COMPANY, INC.
420 Lexington Avenue, New York 17, N. Y.

Call Graybar first for...

Everything Electrical
GraybaR ELECTRIC COMPANY
GraybaR
SINCE 1869
* REG. U.S. PAT. OFF.

IN OVER 130 PRINCIPAL CITIES

Will Sales Stay Up?

Laundry equipment, A.C. are sustaining appliances; higher prices on the way

Appliance sales still seem to be holding up—at least this is indicated by the mid-year reports coming in from manufacturers.

But dealers' reports supplied by a number of utilities are not all of them so optimistic. Air conditioning, fans, and laundry appliances are doing well, and in many cases seem to be holding up sales records that otherwise would sag. Ranges and water heaters in some regions also show mild gains.

Westinghouse Electric Corp's Vice President John W. Craig says his company's appliance sales in the second quarter were the highest in history. Part of this can be attributed to the post-strike demand for Westinghouse products, notes Craig, "but the pipeline filling job now is completed." He expects overall appliance activity to continue at high levels, but some specific products such as ranges to taper off.

Kelvinator Division of American Motors Corp reports business for 16 months out of the past 17 have been ahead of monthly totals for the same period of the previous year. Sales in 1956 first quarter were 13% above the previous three months and in the second quarter moved up another 4%.

May Beat Auto Output

Home laundry equipment seems to be the pacemaker. Kelvinator says its sales are up 40% and Judson S. Sayre, president of Norge Division, Borg-Warner Corp, predicts industry sales could reach 6,200,000 units this year and exceed automobile output. He thinks washer and dryer sales will be 8% above last year, 48% ahead of 1953, and triple those of 1946.

Norge also reports June home freezer sales by its dealers jumped 360% over the 1955 month to set a record.

A Sears, Roebuck & Co economist, however, has forecast that appliances and other durable goods sales this year may not exceed the 1955 level. But, he asserts, the long-term trend into the 1960's is an upward one. One trend is the growing replacement demand for refrigerators, washers, ranges, vacuum cleaners and TV sets, plus a demand for air conditioners and dryers which will add new loads.

One big factor that should have an effect on future sales: Rising prices. General Electric Co has upped factory price 2% to 4% on refrigerators and freezers, about 4% for ranges. It also has raised prices 4 to 5% on dishwashers and food disposers. A few weeks ago it put higher price tags on washers and room air conditioners. Westinghouse will hike prices of its 1957 washer and dryer deluxe models by about $10. Frigidaire Division of General Motors Corp did the same thing, jumping 1957 washer and dryer prices 4½ to 12½%.

Westinghouse, in fact, has announced it will raise the wholesale price on its entire line of major appliances—except laundry equipment—from 1% to 10% after Aug. 15. The increase in cost of steel is one reason.

Norge's Sayre, however, reaffirms his confidence with this statement: "Add consumer appliance demand to such rosy business indicators as a record $44 billion in construction spending and daily retail sales of 4,000 automobiles and you obtain an optimistic picture for appliances during the rest of the year."

Gauges Irrigation Needs

Panel of agricultural experts inspects new electronic unit Puget Sound Power & Light Co is using in Western Washington to advise farmers when to start irrigating and to show amount of water needed to secure max crop production. They are Karl Dimmitt, left, Puget's rural electrification director; Gerald Peterson, Silverdale dairy farmer; Lee Guild, U.S. Soil Conservation Service; John Danielson, Puget's farm consultant; Dino Sivo, Kitsap County extension agent. Using metal stake driven into ground, the "irrigage" measures soil moisture for depths of 6, 12, 18, and 24-in.

S&S SHORTS

Housepower Rating Sheets Ready

Housepower "Rating Sheets" for wiring promotional use have been developed by National Adequate Wiring Bureau. When filled out by a contractor or utility representative, the sheet shows the home owner at a glance what electrical equipment can be added without major wiring alterations. Sheets are of two types, green ones for determining Housepower ratings of existing homes and cream colored ones for new homes. Price of either or both sheets is $1.20 per hundred, plus shipping charges. Order from the bureau, 155 East 44th St, New York 17, N. Y.

Hamil to Keynote Workshop

David A. Hamil, new administrator of the Rural Electrification Administration, will be keynoter at the Inter-Industry Farm Electric Utilization Council's third annual Power Use Workshop Oct. 15 and 16 in Milwaukee, Wis. Like its predecessors, this year's workshop will aim at developing rural electric promotional methods.

Aluminum Strike Poses Questions

When will pinch start to hurt? What'll it bring in price increases? Boost above 1½¢ a lb may follow currently deadlocked talks with USW

As on-again, off-again negotiations between Reynolds Metals Co and Aluminum Corp of America with the United Steelworkers of America slowed down, two questions picked up tempo at EW press time:

1. When will curtailed production begin hurting?

2. How much more is aluminum apt to cost after settlement?

In answer to No. 1, the USW strike affects 12 Alcoa plants employing 18,000 workers and nine Reynolds plants employing 8,500. The walkout has curtailed 60% and 75% of their respective capacity. Four plants of each company have a total output of 811,750 tons of primary metal a year. This amounts to nearly 50% of total U.S. production, so any prolonged outage would definitely be felt. Inventories, though, are in fairly good shape. A backlog equal to about one month's consumption is the current estimate. Observers say that if the strike continues until Labor Day, the economy would not be badly pinched even though fabricators and industrial users would be discomfited.

Agreement was reached by both Alcoa and Reynolds with the Aluminum Workers International Union on a 46¢ an hour three-year package similar to the contract reached in the steel industry. This averted a walkout in nine Alcoa plants employing 15,000 workers and by 6,500 Reynolds men.

Kaiser Aluminum & Chemical Corp's annual output of 435,000 tons of primary has not been affected. Its contract doesn't expire until August 31. Anaconda Co, which produces 60,000 tons a year, completed negotiations in April.

One questioner asked an Alcoa spokesman if 2½¢ per lb might be a close estimate on price increases after agreements are reached. The Alcoa man declined to make predictions but did cite the records since World War II. The industry hasn't had an increase since the war of over 1½¢ a lb, he said. Whether or not the settlement with AWIU and the USW offer will induce a price rise above that amount remains to be seen. Historically, the big three—Alcoa, Reynolds and Kaiser Aluminum & Chemical Corp—have followed-up new contracts with increases from ½¢ to 1½¢ a lb since 1945.

These increases, though, reflected smaller labor costs than the new pacts will include. Here's a rundown of past settlements and their effects on ingot prices:

1953: An 8½¢ hr/man package was ok'd; ingot price rise was 1¢/lb.

1954: An 8¢ package was granted; prices increased 1.3¢/lb.

1955: A 15¢ package was sanctioned; price rise was 1.2¢.

The contract signed by Alcoa and AWIU, which is now making the rounds for ratification, and a similar offer presented to USW would add the following labor costs to operating expenses:

1956: 20¢ an hour per man.

1957: 11¢.

1958: 14½¢.

This is about the same kind of package offered by Reynolds. At EW's press time Reynolds had not yet signed with USW, pending the outcome of Alcoa's negotiations. The company was "optimistic" about settling soon.

GE Sets Up Computer Lab; Aims for Industrial Field

General Electric Co established a computer laboratory in Menlo Park, Calif., last month. It is the first step in a long range program for expansion of advanced engineering facilities in the industrial computer field, the company said.

Called the ERMA (Electronic Recording Machine Accounting) systems laboratory, the addition is headquartered in about 8,000 sq ft of space at Stanford Research Institute until arrangements for about twice the space are completed.

First lab work is being done on the ERMA data-processing system developed by Stanford for the Bank of America. GE's computers, which will be manufactured in Syracuse, N. Y., will be similar but will introduce "certain radical changes," according to the company, one of which will be the use of transistors in place of tubes. In about 1959, the lab will broaden into allied electronic computer problems.

NUCLEAR NOTES

• Westinghouse Electric Corp. in one of first phases of a $20-million atomic energy program, will expand facilities near Pittsburgh. Consolidation of engineering and test groups will permit expansion of atomic power plant work. The revamping of present structures will add 120,000 sq ft of space at Large, Pa., site.

• Leeds & Northrup Co, a Philadelphia instrument manufacturer, has become a member of Atomic Power Development Associates, Inc.

• Foster Wheeler Corp, New York, has been awarded a $1.4-million contract for a pool type reactor by the Danish Atomic Energy Commission. U. S. government will contribute $350,000 toward the cost of the 5-Mw project. The Danes will construct a nuclear research center near Copenhagen and install reactor's mechanical components with F-W aid.

(*More M&M on page* 59)

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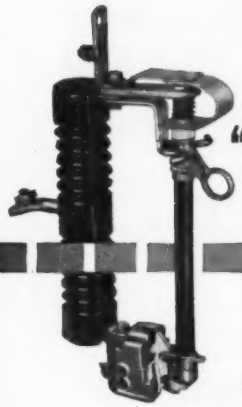

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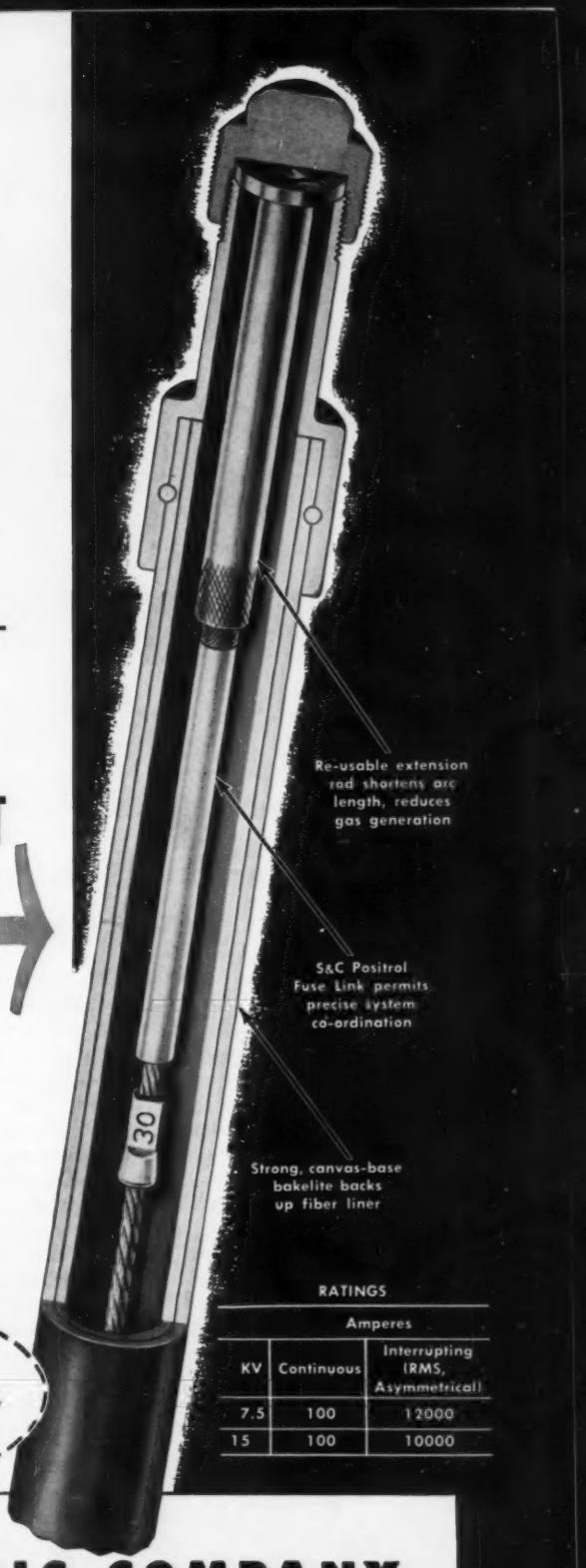
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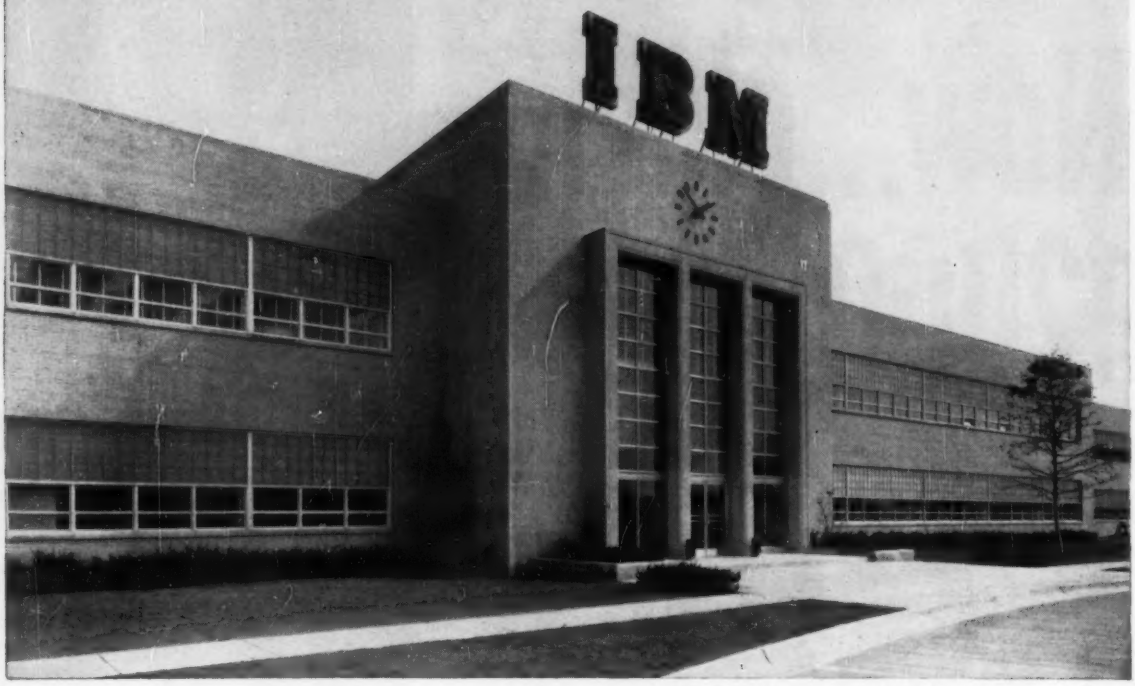
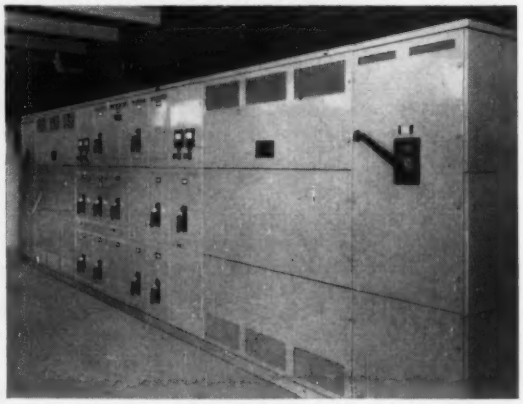


Wagner Unit Substation Transformers supply power for new IBM plant . . .

At IBM's new Kingston Military Products Division plant at Kingston, New York, electricity and automation work together to increase output per manhour and to increase output per unit of plant area. The factory itself is the latest in modern manufacturing plant design and utilizes the modern load center scheme of in-plant electrical distribution.

The unit substations in this plant are equipped with Wagner dry-type Transformers because Wagner transformers are carefully engineered to meet heavy industrial demands—built to stand up under rigorous twenty-four hour a day production schedules. Wagner pioneered in the development of dry-type load center transformers, and the Wagner design is known for its great mechanical strength and electrical stamina.

Wagner unit substation transformers can answer your power needs just as they do at IBM. Choose Wagner for your next load-center installation. Consult the nearest of our 32 branch offices or write for Bulletins TU-205 and TU-214. They give full information on Wagner Unit Substation Transformers for industrial power distribution systems.



IBM uses this double-ended Wagner-equipped unit substation to supply power for lighting and other loads.

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WT56-7

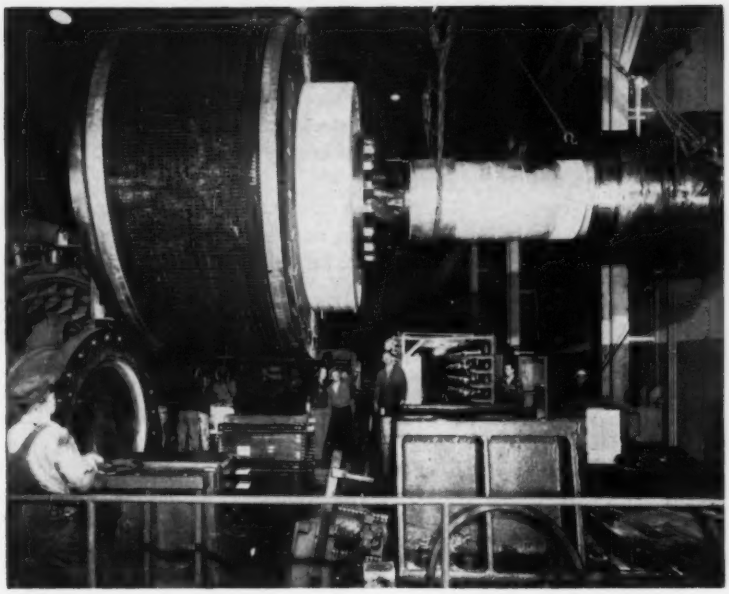
Buys 275-Mw Units

PSE&G's order from Westinghouse to include two units, related equipment

An order for two indentical 275-Mw turbine-generators and associated equipment has been placed by Public Service Electric & Gas Co, Newark, N. J., with Westinghouse Electric Corp. Officials at the manufacturing firm's Pittsburgh, Pa., headquarters describe it as "one of the largest orders for power plant equipment ever placed with a single manufacturer."

The two identical turbines will be cross-compound, quadruple-exhaust units. Steam temperature is reported to be 1,100/1,050 F and pressure 2,400 psi. Both high and low-pressure turbine elements will operate at 3,600 rpm. A unique feature, according to Westinghouse, is that boiler feed pumps for the units will be driven from the generator shafts.

PSE&G's order includes associated power transformers, switchgear, controls and power house auxiliary motors. The equipment will be installed in the utility's Bergen Generating Station in Ridgefield, which is now underway. Turn-over date is expected in 1958.



Teamwork Halves Down Time on Big Motor

Combined efforts of United States Steel Corp engineers and General Electric Co specialists cut the normal down time on routine replacement of this armature from 10 days to four. Prefabrication and preassembly of major parts at GE's Schenectady plant, and assembly at the Columbia-Geneva Steel Division in a specially designed fixture, made the time saving possible.

The Utah Steel plant's productive maintenance program called for replacement of one armature and one-half set of the field coils for a 7,000 hp double armature motor, which drives the rolls on the reversing rougher. Geneva engineers are planning to use the technique on future motor rebuilding jobs.

Steel Strike Settlement Brings $8.50 Increase

Three things were described as evident by observers of the 1956 steel strike as United States Steel Corp announced price increases following settlement by the big companies with United Steelworkers of America:

1. U. S. Steel's increase of $8.50 a ton will be followed quickly by other companies. Although described by U. S. Steel's Chairman Roger M. Blough as adding to, rather than touching off, a new round of inflation, the price hike will at least add a big push to a new go-'round of price and wage boosts.

2. A tight supply situation will face most steel buyers for many months. It will probably apply not only to users of plate, structural and pipe but also to items like hot-rolled sheets, tinplate, terne plate and wire. Losses from the strike have been set at 10 million tons of ingot.

3. The settlement will provide a relatively stable atmosphere for steel expansions for the next three years which may tend to soften the initial cost impact.

In its announcement, U. S. Steel said that the base cost of electrical sheet would go up $21 to $220 a ton. Stainless steel prices went up about 6.25% and alloy steels went up from $5 to $11. Standard carbon structural shapes went up $8 a ton.

Octagonal Connector, New Tool Added by Fargo Co

A new series of octagonal, non-tension compression connectors has been announced by Fargo Manufacturing Co. As pressure is applied to the octagon shape, the company says, high points compress first and fill the conductor's interstices with metal.

Another feature is a centered, grease-filled dividing wall, according to Fargo. As the wall is inserted, it forces grease through the lay of the conductor, which is said to seal out corrosive media. The wall is designed to reduce bi-metallism and control inserted conductor length so each side has identical holding power.

"One-handed" tool has been developed for the octagonal series, but other tools may be used for compressions, the company says. Called the No. 12 Roller Ratchet Compression Tool, the 2¼-lb device can be used with one hand. It has double cam action and jaws designed for wider area of contact. Compression cycle must be completed before the tool releases. Fargo says it cuts the time to complete a compressed connection.

BUSINESS OUTLOOK

Electrical World
AUGUST 13, 1956

The steel industry's new labor agreements are going to cost the industry a lot, but steel should be able to take it all in stride—and the chances are the rest of the economy will do the same.

New union contracts, plus increased pay for non-union employees, social security taxes, overtime and other payroll charges, will cost the industry $375 millions more for labor in the first year alone—a big chunk of money.

• • •

The industry, however, can look forward to absorbing most of these increased costs and at the same time continue to grow. It is counting on three years of stability and uninterrupted production—an opportunity to calculate its costs on a longer-range basis and to undertake expansion plans with some degree of security—thanks to the three-year, no-strike terms of the contract.

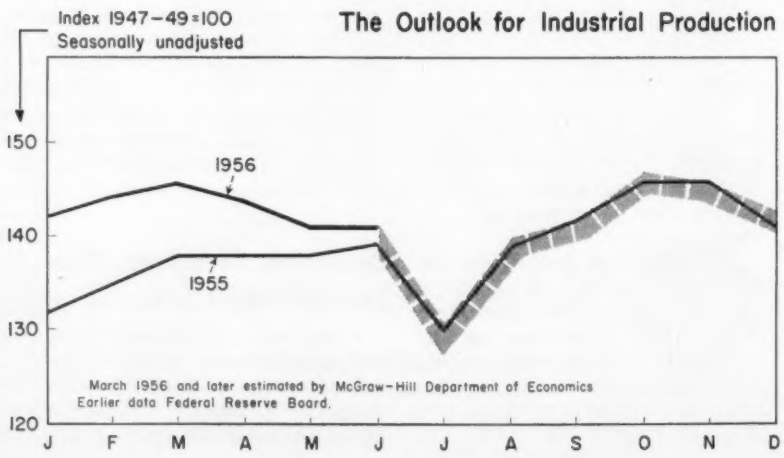
It can also expect offsetting gains in productivity resulting from its $1 billion per year investment in new and improved facilities—gains of 3% and more per year, as compared to increased labor costs of about 7.6% in the first year, 4.7% in the second and 4.9% in the third. Only in the first year will wage increases be clearly much greater than rise in productivity. In the other years increased wage costs should be largely absorbed by increased output per manhour.

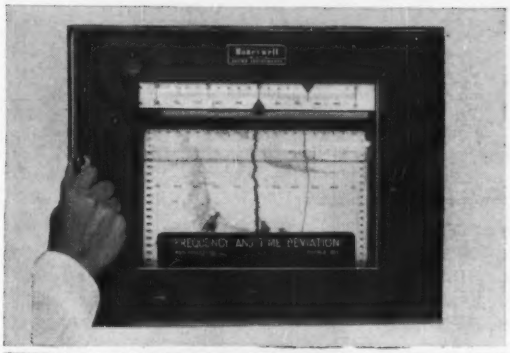
But, because the cost of new capacity in steel's current expansion program will run much higher than previous postwar additions, the steel companies may feel compelled to post additional price increases later on.

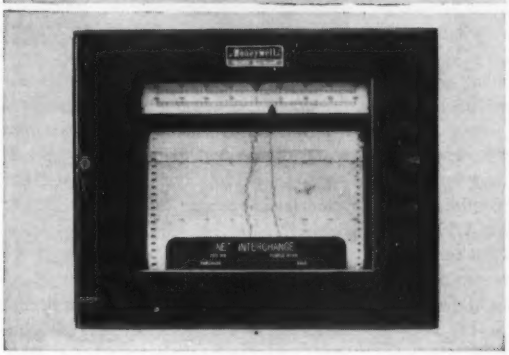
• • •

The economy as a whole should likewise weather the storm. The steel wage increases this time are not the leader they sometimes are—touching off a new round of wage hikes. The recent agreement completes the round of major-industry wage boosts begun by autos last year. Furthermore, **productivity in the economy as a whole is increasing,** maybe fast enough to absorb added payroll charges. And finally, **the Federal Reserve stands ready to clamp tighter the lid on money whenever the threat of real inflation gets too close.**

The steel agreement and the hikes in steel prices are a lot to take, but it looks as though they will be absorbed without sharp inflation—even when industry plans record expansion of plant and equipment.







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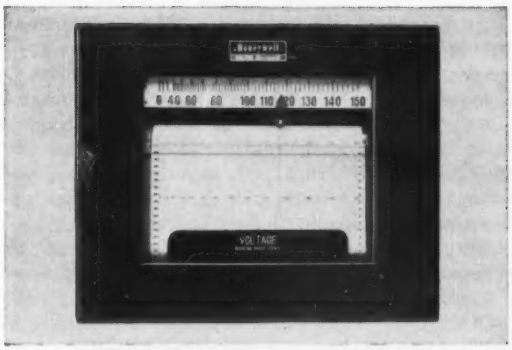

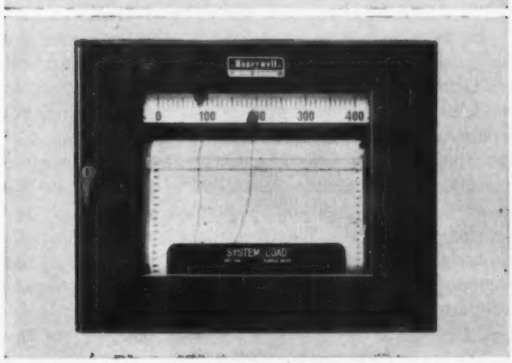

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This Is Fred Seaton . . .

He is Eisenhower's new Secretary of the Interior. What manner of man is he? His record shocks some private power advocates. But he gives no comfort to public power zealots

What can be expected of him in the future? He'll make his own decisions. He believes the law is "the law" and will not attempt to "save" people from it . . .

A man on a big political spot with the election campaign drawing nigh is one of President Eisenhower's bright young men about Washington—the new Interior Secretary, Fred A. Seaton.

At this point, Seaton's job is of extraordinary seasonal importance. Democrats are counting on using his predecessor's policies in administering power and land development—particularly in the Northwest—as one of their liveliest campaign issues.

What manner of man is Seaton, who took over the Interior secretariat when the controversial conservative, Douglas McKay, went home to Oregon to contest for the Senate seat now held by liberal Wayne Morse?

When he chose Seaton, Eisenhower was certainly aware that the move would steal some of the Democratic campaign thunder, although it certainly will not spike the critical guns.

Shocks, Disturbs Both Factions

Seaton is not susceptible to a hard-and-fast label by either of the warring factions represented by McKay and Morse.

Some of his record is shocking to bitter-end exponents of private power. As a senator in 1952, he voted for federal development of St. Lawrence Seaway and against the Tidelands bill (which President Truman vetoed, but which Eisenhower signed in a later, similar version). Moreover, Seaton doesn't find it socialistic for the government to build dams that produce electricity for farmers.

Neither does his philosophy give much comfort to all-out public power zealots. Seaton is strongly against such proposals as federal construction of a high dam at Hell's Canyon. He thinks the partnership approach is the only practical solution to meeting the nation's long-term electrical needs.

"There is nothing new about partnership," he adds. "It was being practiced long before the Administration came into power. Boulder Dam was a partnership project. When you get down to it, there are not too many 100% pure federal power projects."

Seaton feels that demand for additional electrical energy is the biggest problem facing the Interior Department. He doesn't see how the government can finance the $50-billion worth of electrical energy installations that experts figure will be needed over the next ten years.

"Our legislative history shows us," says Seaton, "that Congress never has appropriated enough money to approximate that kind of spending. The government just doesn't have that kind of money. And I don't think the American people want an increase in their taxes for the next ten years to pay for it."

Seaton believes in assessing what can be done and then doing it. And he finds himself not alone. He cites pro-public power Senators Lister Hill and John Sparkman of Alabama, who endorsed partnership development (by Alabama Power Co) of Coosa River power, after Congress refused to appropriate the money for a bill authorizing federal development. He says the same applied to the Markham Ferry project in Oklahoma, with Democratic Senators Robert Kerr and A. S. (Mike) Monroney switching to partnership.

He sees here a lesson for public power people objecting noisily now to the Priest Rapids project.

As Seaton views it, partnership is broader than mere federal cooperation with a private utility company on a given project. It also is partnership between federal government and public utility districts and municipalities.

"As long as I'm here," the dynamic Nebraskan says, "I have a responsibility to get electrical energy to the American people. Right now, we're behind."

Interprets Law Strictly

Some of his Democratic predecessors felt the Interior Secretary and his staff must sympathize with the laws they administer. Seaton feels no such compulsion. He believes an administrator has no moral right to administer the law in the degree of his sympathy for the law.

However, Democratic critics of Administration power policy have charged that the law—particularly the preference clause—has been subverted through unsympathetic administration.

"I've been jumped on more by private power than by the federal power zealots", he declares. "Where I come from in Nebraska, public development is an accepted way of life."

He does, however, draw a sharp line between federal and public development. "I don't believe in federal control of power," he says. "And you don't have to own all the facilities to have control. All you need is a few key plants and transmission lines in key areas. This is the road down which another Administration was traveling very rapidly. I saw the government trying to encroach in Nebraska in power projects created by the local people."

A 1952 speech Seaton made while in the Senate affords insight into his political philosophy:

"We Republicans will find success in the solid middle ground between a spendthrift left and a reactionary right . . .

"It does no good whatever at the

polls to cry 'socialism' every time a measure is offered to combat or correct an evil . . . Certainly it is not socialism to abolish the sweatshop, to regulate hours . . . . Nor is it socialism to conserve our natural resources, to build dams for flood control, irrigation, and electrical power, or to bring electricity to farmers."

Although his nomination was among the least controversial Eisenhower ever made. Seaton expects to attract fire as he goes along.

"In fact," he says, "I'm controversial already"—after little more than six weeks in the job.

But he is not likely to become nearly so controversial as McKay.

In the Senate, where he served for one session in 1952 following the death of former Sen Kenneth Wherry, Seaton is well-liked. The former newspaper publisher and radio chain owner, active in politics since his days at Kansas State College, did not seek re-election, but instead climbed on the Eisenhower bandwagon early.

Shortly after Eisenhower's election, Seaton became an Assistant Secretary of Defense. A year and a half later, he moved to the White House as a deputy assistant to the President for administrative liaison. In these jobs, his ability to get along with all shades of politicians—and, therefore, to get things done— marked him as a man on the way up.

Makes Own Decisions

Some of McKay's troubles traced to controversial actions taken by some of the secretary's assistants. Seaton intends to make his own decisions. "I don't think anybody has any right to speak for the secretary," he says.

Seaton will have delicate decisions to make in coming months. One is whether to approve partnership development of the Trinity River project in Northern California. Pacific Gas & Electric Co has proposed to buy the falling water and develop the power at a saving to the government. However, in authorizing the dam in 1955, Congress left the question of who will develop the power to be settled some 18 months later. Decision time falls shortly after the first of next year.

Seaton takes a broad-guage, long-range view of his job—"We don't have any right to play ducks and drakes with the country's natural resources. What we do today may have quite unforeseen consequences for our grandchildren. . . ."

Chapman Blasts Power Policy

. . . of Administration in fiery report to Democratic Platform Committee urging adoption of public power planks; support of recommendations seen assured

The Eisenhower Administration's record on natural resources policy is scheduled to play a major role in the Democratic party platform this week. Indications point to the party making some of its strongest attacks on the Administration in this field.

Basis for this assumption is a blistering report and recommendations drafted for consideration by Democratic bigwigs by former Interior Secretary Oscar L. Chapman. Chapman has been chairman of a special advisory committee on natural resources for the Democratic National Committee (EW June 25, page 99). For the past months Chapman's group, which includes a number of strong public power supporters, has been drafting the report.

Democratic Support Predicted

The Democratic Platform Committee, under chairmanship of Rep John W. McCormack (D-Mass.), a long-time New Dealer, held hearings in Chicago recently on Chapman's recommendations. At least one member of Chapman's group is also a platform committee member: Rep Gracie Pfost (D-Idaho), long a supporter of public power projects in the Northwest, and bitter-end opponent of Idaho Power Co's license for developing the Snake River.

On the basis of past Democratic utterances, Chapman's recommendations seem assured of party support and adoption. In attacking the Administration's natural resources record, he said it had gone so far as to "usurp the legislative function" and had "blessed the re-emergence of the ghost of Samuel Insull."

Here are Chapman's main points:

1. Treatment of the river basin as a "unit for resources development" must be resumed "without compromise."

2. The "partnership" policy is nothing but "an unholy alliance" between the Administration and private power companies.

3. The goal of controlling rivers to prevent disastrous floods has been sacrificed to give "private profit a higher priority than human lives."

4. The Hells Canyon "giveaway," Administration attempts to "break the back of Tennessee Valley Authority, and the Columbia River basin comprehensive plans," should "shock the nation."

5. Coal, oil, gas, hydro, and atomic energy "should be fully developed in the public interest and for the benefit of the consumer."

6. The "public power yardstick" must be "maintained and strengthened."

7. Only the "strength and comprehensive jurisdiction" of the government in developing multiple-purpose hydro projects can maintain and strengthen the 50-year-old public body preference clause.

8. The federal government should undertake the "construction of large experimental atomic power reactors."

9. "Refusal to prosecute a vigorous atomic power generation program to harness this unbelievably vast energy base (atomic) has caused our nation to lag rather than lead in the world energy race."

10. Regular agencies have been "rendered inoperative" by Republican appointees and are now "stacked for monopoly."

11. The federal government "must resume leadership in conservation investment and act as the logical supplier of public capital."

Unit Includes Truman Aides

In addition to Chapman, the advisory committee had these former Truman officials: former Reclamation Commissioner Michael W. Straus, and former Rural Electrification Administration Head Morris L. Cooke who was also chairman of Truman's Water Resources Policy Committee.

Other members of the group were Sens James E. Murray (Mont.), Richard L. Neuberger (Ore.), and Dennis Chavez (N. M.); Reps Pfost, Clair Engle (Calif.), and Herbert C. Bonner (N. C.); S. R. Finley, Lyle F. Watts, Walter Harrison, Dr. Horace M. Gray, Jesse L. Maury, and Vladimir Shipka.

This feature appears on this page every two weeks.

Future Financing

(Furnished by the Irving Trust Co from the "Financing Calendar")

August is a big month for industrial financings. These securities, sold and to be sold, will total $535 million. Electric and gas companies will sell about $200 million.

Early September is filling up. So far, electric and gas companies have scheduled sales of $60 million for September. Industrials have scheduled over $200 million.

Many utility issues are planned for, but unscheduled, for the fall months. Avoid congestion and choose your date early.

Indications of the bond market: Debt money cost one electric utility rated (A) 4.07%. This is the highest rate since June 1953. A gas utility rated (Baa) rejected bids on its bonds which would have cost the company 4.70%. One finance company which postponed its debt offering last June, because of high rates, was thinking of going ahead with the sale during the first week of August. Their idea was that "money is tight now but might get worse." However, the company has now decided to postpone it "indefinitely."

Due Diligence Meetings: Aug. 21, Consolidated Natural Gas Co; Aug. 27, Tampa Electric Co; Sept. 5, Gulf States Utilities Co; Sept. 18, Virginia Electric & Power Co; Sept. 28, Columbia Gas System, and Oct. 15, Ohio Power Co.

DATE	COMPANY	Amount of Offering (millions) DEBT	EQUITY
AUG. 14	Consumers Power	$40.0-C	$ .....
14	Commercial Credit	50.0-N	.....
16	Mack Truck	19.2-N-rt	.....
17	Central Illinois Light	.....	8.0-N Pfd
21	Pacific Telephone & Telegraph	78.0-C	15.6- -rt COM (a)
21	Minneapolis-Honeywell Regulator	25.0-N	.....
27	Detroit Edison	59.8- -cv-rt	.....
28	Consolidated Natural Gas	30.0-C	.....
29	Tampa Electric	10.0-C	.....
30	New England Telephone & Telegraph	.....	19.0- -rt COM (a)
AUG. No Date	Boulder Acceptance	.....	18.0-N COM
	Associates Investment	50.0-N	.....
	J. P. Stevens	30.0-N	.....
Sept 10	Gulf States Utilities	16.0-C	4.2-C COM
11	General Telephone of California	20.0-C	.....
12	Northern States Power	15.0-C	.....
17	Blackstone Valley Gas & Electric	.....	2.5-C Pfd
25	Virginia Electric & Power	20.0-C	.....
Sept No Date	Pennsylvania Tunnel	25.0-C	.....
	Jacksonville Expressway Authority	70.0-	.....
	Proctor & Gamble	70.0-N	.....
	St. Louis—San Francisco Ry	61.6-R	.....
	City of Memphis—Power Plant	135.0-N	.....
	Federal Land Banks	200.0-C	.....
3rd Quarter of 1956 (Month not indicated)	California Toll Bridge	34.0-C	.....
	Rochester Gas & Electric	.....	5.0-N Pfd
	Texas Eastern Transmission	.....	15.0-N Pfd
	Kansas Nebraska Natural Gas	5.5-P	.....
	U. S. Rubber	50/60.0- -cv-rt	.....
	Dade County, Florida	34.5-C	.....
	City of Dallas	40.7	.....
	Washington State Toll Bridge	227.0-C	.....
	Oklahoma Turnpike	63.0	.....
	Long Island Lighting	.....	12.0-N Pfd
	Arizona Public Service	8.0-P	.....
	North Carolina State School	25.0	.....
	El Paso Natural Gas	30.0-P	.....
Oct. 2	Columbia Gas System	25.0-C	.....
9	California Electric Power	8.0-C	.....
16	Public Service of Indiana	30.0-C	.....
17	Ohio Power	28.0-C	6.0- -Pfd
23	Central Illinois Public Service	.....	5.7-C
Oct. No Date	Delaware Power & Light	.....	5/8.0-C Pfd
	North-South Indiana Toll Road	220.0-C	.....
	Alabama Gas	7.0-P	.....
	American Telephone & Telegraph	.....	575.0- -rt COM
	Transcontinental Gas Pipe Line	.....	7.0- -rt COM
	Florida State Turnpike Auth	185.0-N	.....
Nov. 13	Metropolitan Edison	10.0-C	.....
27	Carolina Power & Light	15.0-C	.....
Nov. No Date	Transcontinental Gas Pipe Line	20.0-P	.....
	Long Island Lighting	20/25.0-C	.....
	New England Power	10.0-C	.....
Dec. 3	U. S. Governments	9,100.0- -R	.....
Dec. No Date	Appalachian Electric Power	24.0-C	.....
	Essex County Electric	20.0-C	.....
4th Quarter of 1956 (Month not indicated)	Tennessee Gas Transmission	50.0-N	.....
	Texas Eastern Transmission	15.0-N	.....
	Otter Tail Power	5.0-N	.....
	Northern Natural Gas	20.0-N	.....
	Philadelphia Electric	30.0-C	.....
	Southern Union Gas	.....	3.0- -rt COM
	Columbus & Southern Ohio Electric	.....	some Pfd
	U. S. Governments	0/2,000.0*	.....
	North American Aviation	.....	40.0-N-rt COM
	Central Vermont Public Service	1.8-N	0.7-N COM
	American Louisiana Pipeline	.....	15.0-C Pfd
	Southern California Edison	.....	26.0-N COM
1956 (Month not indicated)	Texas Gas Transmission	28.0	.....
	Grand River Dam Auth., Okla	27.0	.....
	Southern Nevada Power	7.0-C	.....
	Hawaiian Electric	.....	5.0-N Pfd
	Michigan Bell Telephone	30.0-C	.....
	Ford Motor	300-400	.....
	Portland General Electric	16.0-P	.....

Symbols: C—Competitive; N—Negotiated; P—Private; R—Refunding; cv—convertible; rt—Rights; Pfd—Preferred; COM—Common. (a) Does not include amount to be offered to parent company. *Estimated.

Think of it! 1000 feet of #6 copper weatherproof costs you $54.43...but 1000 feet of Kaiser Aluminum #4 polyethylene weatherproof wire costs you only $30.00!

That's an enormous saving! And in addition, KW WIRE field, engineering and research services can help you save more money in handling, construction, maintenance. Contact us . . . or one of our many distributors.

COST COMPARISONS
(Based on prices in effect 5/15/56.)

ALUMINUM		COPPER	
#4 solid PE (2/64")	$ 30.00 —	#6 solid DBWP*	$ 54.43
#2 strand PE (3/64")	$ 47.50 —	#4 solid DBWP*	$ 80.08
#1/0 strand PE (4/64")	$ 77.00 —	#2 strand DBWP*	$133.16
#4/0 strand PE (4/64")	$152.00 —	#2/0 strand DBWP*	$260.91

Delivered price on quantities of 20,000 lbs. or more.

Point of shipment price on 30,000 lbs. or more. Freight adders extra.

*Hard drawn, Double Braid URC.

ALUMINUM IS THE ANSWER TO ADEQUATE WIRING

KW WIRE FOR BIG SAVINGS

Kaiser Aluminum & Chemical Sales, Inc. *Executive Office*, Kaiser Bldg., Oakland 12, California; *General Sales Office*, Palmolive Bldg., Chicago 11, Illinois.

Kaiser Aluminum

WEATHERPROOF DUPLEX TRIPLEX QUADRUPLEX — NEOPRENE • POLYETHYLENE • "TWO-SHOT" • SOLID OR STRANDED AAC, ACSR OR AAAC (ALL ALUMINUM ALLOY CONDUCTOR)

ACSR ALL-ALUMINUM OR AAAC

ARMORED SERVICE DROP

BUILDING WIRE & CABLE

SERVICE ENTRANCE CABLE

BUS CONDUCTORS — RECTANGULAR BAR; TUBULAR CONDUCTOR; SOLID ROUND BAR

Generation by Ownership and Type of Prime Mover

(Percent of Total)

	Hydro			Steam			
	Investor-Owned	Cooperatives	Government-Owned	Investor-Owned	Cooperatives	Government-Owned	Total Internal Combustion
1955*	9.4	0.0	11.2	67.5	0.4	10.7	0.8
1954	11.1	0.0	11.6	67.5	0.4	8.6	0.8
1953	11.6	0.1	12.1	68.2	0.3	6.8	0.9
1952	13.2	0.1	13.0	67.3	0.2	5.2	1.0
1951	13.9	0.1	12.9	67.3	0.2	4.6	1.0
1950	15.4	—	13.7	65.5	0.1	4.2	1.1
1949	15.8	—	15.0	64.1	0.1	3.8	1.2
1948	15.3	—	13.9	65.1	0.1	4.5	1.1
1947	17.3	—	13.4	63.9	—	4.3	1.1
1946	20.4	—	14.7	60.5	—	3.3	1.1

*Preliminary

Source: Edison Electric Institute

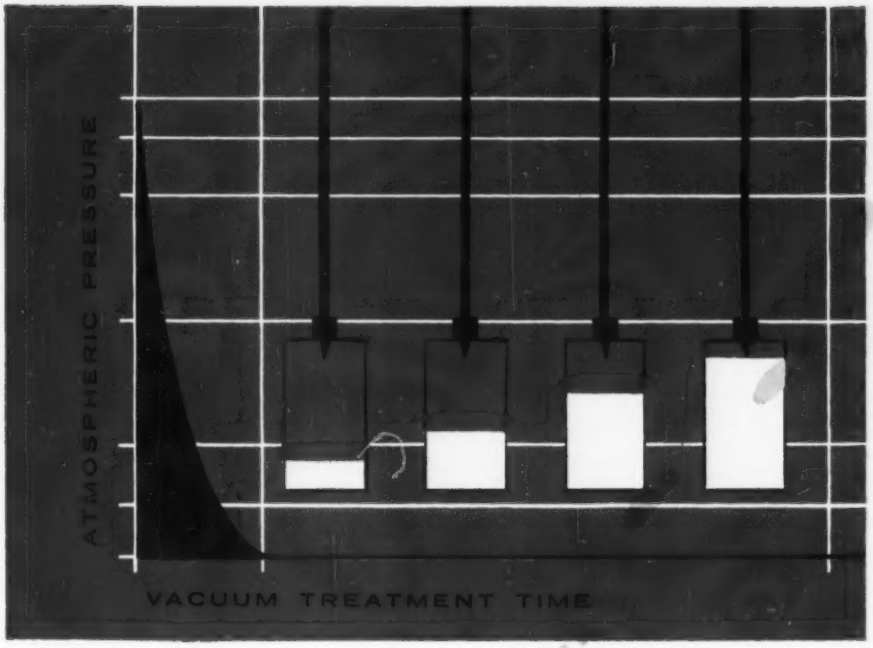
Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	May	117.43	116.78	106.32	10.4
Peak—Class I Systems (million kw)	May	92.6	91.4	83.9	10.4
Estimated Dec. '56 Peak (million kw)	May	106.00	105.88	103.44	2.5
Production—billion kwhr	May	49.09	47.49	43.35	13.2
Hydro		11.70	11.55	9.81	19.3
Fuel		37.39	35.94	33.54	11.5
Sales—billion kwhr	May	44.18	44.51	39.49	11.8
Residential		11.02	11.82	9.76	12.9
Commercial		6.74	6.70	6.17	9.2
Industrial		24.04	23.53	21.25	13.1
Other		2.38	2.46	2.32	2.6
Fuel Consumption	May				
Coal—million tons		12.05	11.95	10.76	12.0
Oil—million barrels		4.47	5.76	4.88	−8.4
Gas—billion cu. ft		110.51	89.72	103.43	6.8
Net Income Class A & B Co's—$ million	May	103.15	115.46	92.7	11.3
Residential Customers—millions	12 mos.	44.76	44.67	43.51	2.9
Revenue per kwhr	ended	2.62¢	2.63¢	2.67¢	−1.9
Avg kwhr per customer	April 30	2,838	2,819	2,623	8.2
Avg annual bill		$74.36	$74.12	$70.01	6.2

Business Statistics . . .

Indexes: 1947–49 = 100					
FRB Industrial Production	June	141	141	139	1.4
ENR Construction Cost	July	145.6	145.1	138.4	5.2
BLS Cost-of-living	June	116.2	115.4	114.4	1.6
NEMA Sales	April				
Insulation materials		163	168	160	1.9
Electric appliances		111	120	102	8.8
Wholesale prices	May				
Motors and generators		132.1	130.4	120.8	9.4
Transformers and regulators		137.5	135.3	127.3	8.0
Switchgear and fuses		151.2	149.0	135.6	11.5
GNP—annual rate—$ billion	1st Qtr.	398.5	397.3	375.3	6.2

another step to automatic quality



MOLONEY'S NEW VACUUM TREATMENT Fills HyperCore Transformers with Oil Automatically . . . While Under Vacuum

After drying in conveyor ovens Moloney HyperCore Transformers are vacuum treated immediately, while still above ambient temperature, preventing moisture condensation and absorption.

Inside Moloney's new vacuum tanks, atmospheric pressure is reduced by powerful new exhaust pumps . . . assuring removal of any residual moisture.

AND, while under vacuum, transformers are filled with precisely the right amount of oil . . . automatically, eliminating trapped air in HyperCore Transformers. This assures a long, efficient and dependable service life for every HyperCore Transformer.

There's no risk when you specify Moloney. HyperCore Transformers are *better than ever* . . . in every way . . . because mechanized production and automatic testing facilities in Moloney's *new* HyperCore Transformer Plant insure HyperCore dependability.

HyperCore Transformers are available from stock in all Standard Ratings in both Conventional and CSP designs.

ME56-18

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Power Transformers • Distribution Transformers • Load Tap Changing Transformers • Regulating Transformers • Step Voltage Regulators • Primary Unit Substations • Secondary Unit Substation Transformers • Network Transformers • Series Street Lighting Transformers • Subway Transformers • Industrial Dry Type Transformers • Capacitors • Transformers and Inductors for Electronics

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Get the Regulator you can

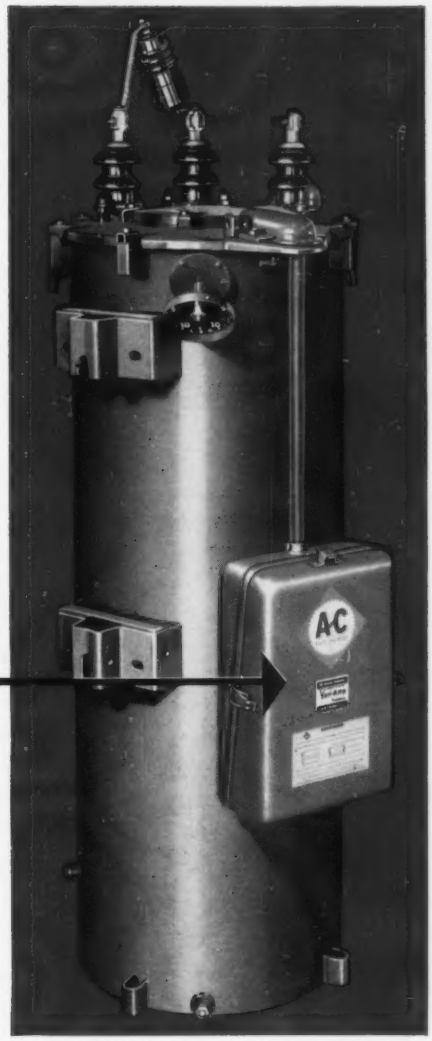
Tailor To Your System Needs

Vari-Amp feature has built-in provisions for system needs

Now you can tailor a voltage regulator to your system's exact requirements—no need to accept ±10% regulation if your system can operate more profitably at a different range. The *Vari-Amp* feature on Allis-Chalmers voltage regulators provides *five* current ratings — 25 regulating combinations.

You can even utilize unequal ranges of regulation. Here's how it might work on a distribution regulator: set a unit for 6¼% range in the raise direction, providing 135% current capacity, and for 10% in the lower direction, at 100% of current capacity.

In addition to providing for many variations to suit many different systems, the *Vari-Amp* feature gives you more for your regulation dollar by permitting increasing capacity in five steps. On a distribution regulator, for example, you can get 160% of current capacity by reducing the range of regulation to ±5%.



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